NETWORKED CIVIL SOCIETY: THREE ESSAYS ON THE GOVERNMENT–NONPROFIT RELATIONSHIP IN CHINA

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Submitted to the faculty of the University Graduate School
in partial fulfillment of the requirements
for the degree
Doctor of Philosophy
in the Lilly Family School of Philanthropy,
Indiana University
November 2018

Accepted by the Graduate Faculty, Indiana University, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ACKNOWLEDGMENT

This dissertation and my academic journey are impossible without many hands. First and foremost, I would like to thank my research committee chair Dr. Richard Steinberg. His patience, humor, and rigorous academic attitude are the best training I have ever received. Moreover, I also learned numerous Shakespeare's quotes from him.

I am grateful to Dr. Leslie Lenkowsky for introducing the School to me in 2013 when we first met in Beijing. Dr. Lenkowsky not only helped me with starting the exciting adventure as a scholar, but also served as my wife's advisor while she was studying in the US. As the Dean of the School, Dr. Amir Pasic's strong leadership leads the rapid development of the School from which I greatly benefit, and his comments on my research always remind me to be a leading scholar in my research areas. Dr. Mark Ottoni-Wilhelm always gives me clear and constructive suggestions on how to design my study and be critical on numbers. His efforts of facilitating interdisciplinary conversations also inspire me. It is my great fortune to have all these wonderful mentors in my research committee.

My doctoral study also benefited from Dr. Lehn Benjamin's direction of the doctoral program and serving as our advisor in the first two years. Her support made me confident in advancing every step. I thank Dr. Simon DeDeo and Dr. Sara Konrath, they mentored me with great patience while coauthoring papers. I thank Dr. Una Osili, Dr. Gregory Witkowski and Dr. Tyrone Freeman who gave me so much flexibility in graduate assistantship. I thank Dr. Patrick Rooney for his leadership in the School and his strong support while I was on the job market.

I am also grateful to many mentors outside of Indiana University. Dr. Peter Frumkin at University of Pennsylvania recruited me to the Penn Doctoral Fellows Program in which I could devotedly improve two of the chapters in my dissertation with his and other fellows' helps, and he also served as one of my referees while I was on the job market. Dr. Chao Guo at University of Pennsylvania gave me many suggestions on publication and how to shape the research trajectory as a junior scholar. Dr. Peter Bol at Harvard University provided me an opportunity to join the Institute for Quantitative Social Science community at the end of my doctoral study and consistently reminded me to complete the dissertation in time.

I would also like to thank my colleagues. Qun Wang at Indiana University, Dr. Chao Dong at CDD Tech Co. Ltd., Dr. Huafang Li at Grand Valley State University, and more than two hundred interns and volunteers, we together initiated the database project for studying Chinese foundations. President Yueguang Chen, Dr.

Chunmiao Sun, Shan Tang, and Meng Wang at Zhejiang Dunhe Foundation, the database project is impossible without their generous support.

Finally, my greatest appreciation goes to my family: my mother Cunfang Yang, father Chengyou Fan, and birth father Daorong Ma in paradise, sister Jing Ma. They are always my role models. My deepest love goes to my wife Zhaonan Zhu. She accepted many of my weird behaviors for which the Ph.D. training should be responsible, and gave up her Assistant Professor position and promising academic career path in China.

"What's past is prologue; what to come, in yours and my discharge."

Ji Ma

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This dissertation has two goals: 1) Introducing data science methodologies to nonprofit studies; 2) Examining the impact of social relations on nonprofits' social and economic behaviors. Ultimately, this dissertation provides empirical evidence for a new paradigm which is just in formation by a few scholars: a holistic network theory of government–nonprofit relationship. Chapter 2 establishes a robust and general-purpose database which has the potential to support the development of a research topic. It also introduces the methodology for data management in contemporary quantitative social science. Based on the database established, Chapter 3 approaches the research question on nonprofit's autonomy using network theory and finds that, although nonprofit organizations in China may lose their autonomy because of government officials on board, these organizations still enjoys a substantial level of freedom in the organizational network. The Chinese nonprofit sector suggests the existence of autonomous order theorized by political philosophers and observed in liberal societies. Chapter 4 reconsiders a classic research question in public economics – the crowd-out/in effect of government funding on private donations to nonprofits. This chapter proposes an innovative theoretical perspective for understanding the role of social relations in crowding mechanism: compensating mode and amplifying mode. Analysis suggests that, although government funding to a nonprofit may crowd out the private donations to the same organization, private donations are not reduced but redistributed to other nonprofits in the organizational network. This chapter also uses standardized data workflow to boost the research life-cycle, information extraction techniques to construct structured dataset from semi-structured raw data files, demonstrates how data science methodologies can help causal inference in classic econometrics.

Richard Steinberg, Ph.D., Chair

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Chapter 1 Introduction: Toward a network theory of government–nonprofit relationship

1.1 Conflict and Contingent: A Tale of Two Paradigms for Understanding the Government–Nonprofit Relationship

While charities and "social organizations" appear early in China's history, the majority were closed during the Cultural Revolution in the 1960s and 1970s (Ye, 2003). The nonprofit sector only re-emerged during the reform era of the 1980s, as part of the government's push to decentralize and devolve power away from direct state control (Q. Ma, 2002a; Teets, 2013). In the following decades, the sector has expanded so rapidly that scholars today ask whether it represents the rise of a Chinese civil society: a dense network of groups that bring together citizens to accomplish activities outside of government control.

That concept, civil society, got popularity when Alexis de Tocqueville connected the early stages of American democracy to the growth of voluntary associations of ordinary citizens for everything from the promotion of temperance to the founding of schools (de Tocqueville, 2012, Chapter 5). Ever since, political theorists and sociologists have tried to understand the role that these associations might play in the liberalization of authoritarian regimes and the early stages of democratic rule. The concept of civil society has continued to evolve; in a recent study of the "illegal" nongovernmental organizations (NGOs)[1] in China, Spires (2011) quotes Foley and Edwards (1996) to describe a neo-Tocquevillian concept of civil society as "an autonomous sphere of social power within which citizens can pressure authoritarians for change, protect themselves from tyranny, and democratize from below." For these reasons, hardline members of the Chinese state leaders are liable to view the very concept of civil society as a "trap" set by "Western countries" (Simon, 2013, p. xxx). A central theme of research on the Chinese nonprofit world is thus how autonomous nonprofits can be in the presence of state control (C. L. Hsu, 2010; Q. Ma, 2002b).

Yet the existence of non-governmental associations does not necessarily imply a civil society in the Tocquevillian mode or even a threat to authoritarian rule. While countries in the West have accepted nonprofits that operate independent of government control, foundations in China must contend with a one-party system potentially intolerant of organizations that might hold it accountable or draw attention to its deficiencies, and that therefore strives to control and monitor it. Concerns about the

[1] Scholars use "NGO" and "nonprofit" in different contexts, the former often seen in political context, the latter in service deliver. This dissertation uses the two terms interchangeably.

lack of autonomy in the nonprofit sector have led many observers to talk in terms of state-corporatism (Q. Ma, 2002a; Whiting, 1991), where the nonprofit sector is an auxiliary and dependent system of the state. In Schmitter (1974, pp. 99–100)'s classic definition, the relevant organizations in state-corporatism parallel those of government agencies, being "singular, noncompetitive, hierarchically ordered, sectorally compartmentalized, interest associations exercising representational monopolies."

In general, civil society can be understood through a paradigm focused either on conflict, or on contingent cooperation. The *conflict paradigm* assumes that the state and non-state organizations have goals that are in fundamental tension. These theories leave little room for extensive cooperation between the two sectors (Lester M Salamon, 2006). In the particular case of Chinese nonprofits, the idea of civil society as a challenge to state power can be found in Kang and Han (2008) which describes a "system of graduated control" where the state exerts different control strategies over different types of nonprofits, depending on the level of threat these extra-government organizations are seen to pose.

By contrast, the *contingent cooperation paradigm* sees nonprofits as potential service arms of the state, at times able to implement the state's goals in a more efficient and effective fashion. Spires (2011) popularized an account of this form, based around the idea of a "contingent symbiosis" between government and nonprofits, in which illegal NGOs are allowed to operate as long as they relieve the state's responsibilities for social welfare. Another example is "consultative authoritarianism" which promotes an "operationally autonomous civil society" and a "sophisticated authoritarianism that uses more indirect tools of social control" (Teets, 2013, p. 36).

Because of the authoritarian political context in China, both paradigms tend to be politicized and focus on how much autonomy the nonprofit sector can have in the presence of state control (C. L. Hsu, 2010; J. Y. J. Hsu, Hsu, & Hasmath, 2017; Kang & Han, 2008; Q. Ma, 2002b). This tendency is critical for understanding and facilitating the democratic process in authoritarian countries, but the overwhelming emphasis on political implications ignores the complex interactions between nonprofit sector and state, sustaining a "theoretical poverty" in understanding the government–nonprofit relationship (Salmenkari, 2013).

1.2 Perspective from the United States: Supplementary, Complementary, and Adversarial

The cultural and historical contexts in China are special, but the challenge for understanding the government–nonprofit relationship is not unique to this Eastern country. In the United States where the term "nonprofit sector" was invented (Hall, 2006, p. 50) and has produced most of the literature on nonprofit sector (J. Ma & Konrath, 2018), the relationship between government and nonprofit sector is an enduring and fundamental research question because it tries to understand why nonprofit sector exists.

This earliest dominant theory explaining the existence of nonprofit sector was the "market failure / government failure" theory developed in the mid-1970s (Weisbrod, 1975, 1977). From this theoretical perspective, nonprofits exist because government fails to provide enough public goods. This relationship is termed the "supplementary relationship" and shares the rationale of the contingent paradigm in Chinese context. The "complementary relationship" theorizes the partnership between nonprofit and government: the nonprofit organizations and government departments work together to deliver public goods. And the "adversarial relationship" views that nonprofits advocate changes in government's behavior and make the government more accountable, and reciprocally, the government regulates on nonprofits' operations (Young, 2006, pp. 39–40). The adversarial view is also similar to the conflict model in Chinese studies.

The three views of government-nonprofit relationship are not rival but coexist. As early as the Colonial period when the government was still primitive and limited in capacity, the government–nonprofit relationship was supplementary since many of the under-provided public goods were delivered through voluntary associations (Trattner, 1998, Chapter 2). During the New Deal and Great Society when the government took more responsibilities in social welfare programs, the nonprofit sector also retained a vital and increasing role in social welfare, suggesting the complementary partnership between nonprofit and government (Lester M. Salamon, 1987). Other than delivering social service and public goods, nonprofits also have an important role of advocacy because they can represent the groups they served; meanwhile, the government puts a series of regulations on nonprofits, limiting their ability to lobby (Berry & Arons, 2003). This suggests the adversarial relationship between nonprofit and government. By examining American history, all these three types of relationships coexist in American history across all eras (Young, 2006, pp. 49–72).

However, even in the US where scholars produce most of the literature on nonprofit sector, the relationship between government–nonprofit is oversimplified, and the theories used to understand the relationship is incomplete — there need to be integrative and holistic theories of "social contract" which incorporates all the three different relationships (Lester M. Salamon, 2012; Young, 2006, pp. 72–76).

1.3 Bridging the Paradigms: Theorizing "the Sector" as an Intermediate Space and Process

Both Chinese and American studies suggest the importance of a holistic theory of the government-nonprofit relationship. Rather than theorizing the nonprofit organizations as an independent sector and social power with clear boundaries between government and business, scholars suggest that it is more important to theorize the interactions between different social actors (i.e., nonprofit, government, and business) as a social process and dialogue, emphasizing the interdependence rather than independence (Corry, 2010, p. 15; Lester M. Salamon, 1995; Selsky & Parker, 2005).

Two recent studies on Chinese civil society are just in this trend. Teets (2017) studied the policy networks created by civil society organizations in China and contended that these networks function similarly to those in democracies. Within these networks where ordinary citizens and government officials are all embedded, public participation in the policy process becomes possible and influential. However, these observations are largely ignored in the literature on policy process in authoritarian countries. Yao Lu and Tao (2017) reevaluated the institutional basis for collective action in China. They pointed out that the informal lineage groups form strong "horizontal linkages" between citizens and can effectively mobilize the resource for collective action. Meanwhile, the civic organizations provide important "vertical linkages" which can complement the horizontal linkages with access to government officials, and therefore facilitate the success of collective action. Their study challenged the traditional notion that an organizational basis for collective action is absent in nondemocratic counties.

1.4 A Holistic Theory of the Government-Nonprofit Relationship: Network Structure and Spontaneous Order

Previous studies have documented the strategies and tactics of individual nonprofits, either through case studies or the identification of qualitative patterns of behavior across multiple cases (e.g., Estes, 1998; Yiyi Lu, 2007; Saich, 2000; Teets, 2013). Civil

society, however, is more than just the existence, and even the autonomy, of nonprofits as individuals. It is how these organizations connect and cooperate with each other, forming "sufficient horizontal linkages among various social actors to constitute a civil society" (Salmenkari, 2013, p. 682): the organized "multiple overlapping and intersecting sociospatial networks of power" (Mann, 1986, p. 1). The social actors possess some unique properties at the network level which are different from those at the individual level and neglected by traditional approaches to government–nonprofit relationship.

The network can organize social actors in two extreme settings. In the first setting, an ideal central agent possesses the complete knowledge of how to deal with changes and issues orders in a timely fashion. In the second setting, all actors in society have only the most relevant knowledge for making decisions on their own behalf. The first centralized setting can hardly work because a real agent can only possess the incomplete knowledge and information, but the second decentralized setting is more realistic in terms of using knowledge (von Hayek, 1945, p. 524).

An extreme example of the first arrangement can be a highly centralized social structure and planned economy, like the mainland China during Mao's governance; an extreme example of the second arrangement can be an atomistic-type society within which there are prevailing interpersonal conflict and antagonism (Rubel & Kupferer, 1968). In between the two extreme structures, there is a polycentric social structure organized by spontaneous orders (von Hayek, 2011, p. 230).

The spontaneous order is an important feature of the sociospatial network in a liberal society. As Polanyi stated: "When order is achieved among human beings by allowing them to interact with each other on their own initiative–subject only to the laws which uniformly apply to all of them–we have a system of spontaneous order in society" (Polanyi, 1951, p. 159).

The spontaneous order is an aggregation of individual action but not a result of human intention (Barry, 1982, p. 8). It is critical for individuals in a liberal society because "they are not determined by any specific command, whether of a superior or a public authority; the compulsion to which they are subject is impersonal and general" (Polanyi, 1951, p. 195). It should be improved as much as possible to protect the freedom and restrict the use of coercion in a society (von Hayek, 2011).

To understand government-nonprofit relationships, we must study not only how the state acts on individual nonprofits, but also how it interacts with the networks through which these nonprofits share personnel, information, and resources. The infrastructural power the state exercises may be both enhanced, and dissipated, by

the horizontal connections between the organizations it penetrates. Moreover, the network itself may have formed spontaneous orders which are beyond any party's control. The notion of spontaneous order goes beyond the traditional conception of autonomy considered by existing theories explaining the government–nonprofit relationship, but it is a crucial component for developing a liberal society.

1.5 Dissertation Contributions

This dissertation has two goals: 1) introducing data science methodologies to nonprofit studies, and 2) examining the impact of social relations on nonprofits' social and economic behaviors. Ultimately, this dissertation provides empirical evidence for a new paradigm which is just in formation by a few scholars: a holistic network theory of government–nonprofit relationship. Although this dissertation is not the first literature approaching these topics, it provides detail and systematical examples of applying data science and extending network analysis in nonprofit studies.

1.5.1 Introducing Data Science Methodologies

Data science can be defined as "a set of fundamental principles that support and guide the principled extraction of information and knowledge from data" ((Provost & Fawcett, 2013, p. 52)). It overlaps with numerous other concepts in industry and academia, for example, big data, data-driven decision making, data mining, and scientific computing, etc. Data science also draws knowledge and methods from established disciplines, for instance, it emphasizes the principles of causal inference in statistics and heavily relies on computer science technologies (Provost & Fawcett, 2013).

In general, data science includes a set of skills and principles to achieve the following goals:

P.1 Data and data life-cycle management intends to standardize the workflow and support the replication of results and reuse of data. Researchers concur that there is a reproducibility crisis in contemporary natural and social science, that is, many of the published results can hardly be replicated (Baker, 2016; King, 1995). Scientific advancement is built on the knowledge ground laid by past works. The reproducibility crisis casts doubts on the foundations of scientific disciplines.

P.2 Extracting information from messy data which can be unstructured (e.g., a poem), semi-structured (e.g., a grant proposal), or structured (e.g., census data).

P.3 Innovative analysis methods, for example, network analysis for analyzing relational data, unsupervised machine learning using a training dataset, and real time analysis of extremely large datasets which may be of terabyte or even petabyte size.

P.4 Innovative knowledge extraction and representation methods, for example, data visualization and user interaction.

Although these purposes are not unique to data science, traditional disciplines only focus on one or few of them. This dissertation manifests the application of all these skills and principles. Chapter 2, *The Research Infrastructure of Chinese Foundations, a database for Chinese civil society studies*, is an example of P.1. It establishes a robust and general-purpose database which has the potential to support the development of a research area. Chapter 3, *State power and elite autonomy in a networked civil society: The board interlock of Chinese nonprofits*, covers P.3 and P.4. This chapter not only employs traditional methodologies in social science research (e.g., operationalizing social concepts and regression analysis), it also makes use of innovative analysis methods including network analysis, using simulations as a null model, and visualizing the evolution of regression coefficients. Chapter 4, *Funding nonprofits in a networked society: Two models of crowding mechanism of government support*, shows the application of P.1 and P.2. This chapter uses standardized data workflow to boost the research life-cycle. It also uses information extraction techniques to construct a structured dataset from semi-structured raw data files. Moreover, this chapter demonstrates how data science methodologies can help the statistical inference in classic econometrics.

1.5.2 Impact of Social Relations on Nonprofits

Although the "problem of embeddedness" (Granovetter, 1985) has been discussed for decades, traditional and mainstream studies of organizational behavior still often consider organizations as atomic individuals, ignoring the fact that these institutions are embedded in and influenced by their social relations. As reviewed in the above sections (Section 1.3 and 1.4), a holistic perspective and understanding of organizational behavior is in demand. Network analysis has been greatly utilized in the

last few decades to understand the organizational and personal behaviors in complex networks (Borgatti, Mehra, Brass, & Labianca, 2009). Because of the exponential increase in computational power, scholars are able to analyze the interactions among thousands or even millions of actors. But network analysis is not only a quantitative method, it is also a theoretical perspective (Borgatti & Halgin, 2011; Borgatti & Lopez-Kidwell, 2011).

Social network analysis as a theoretical perspective. In the early 20th century, the properties and influences of social relations had already been noticed by sociologists (e.g., Weber and Simmel). However, serious studies and formation of social network conceptions were not developed until the mid-20th century (Scott, 1988, p. 110). Most of these early classical studies did not use mathematical methods but emphasize the theoretical and qualitative understanding: "there was something fundamentally wrong with a sociology which did not recognise and take seriously the patterns created by social relations" (Scott, 1988, p. 111). For example, J. A. Barnes (1954) anthropological study examined the important positions in social structure for governing and organizing social life. Without relying on mathematical analysis, Granovetter's 1983 classic paper emphasized the critical functions of "weak ties." In general, these studies re-examined old questions from a theoretical perspective of network and generated many innovative insights.

Social network analysis as a quantitative method. Social network analysis has been exponentially extended since the 1960s and 1970s because of the development of mathematical analysis (Scott, 1988, p. 111). Numerous metrics for measuring the importance of nodes in networks were invented, for example, degree centrality, betweenness centrality, closeness centrality, and page-rank (Freeman, 1977, 1978). Social networks can also be analyzed mathematically by clusters, that is, some nodes are preferentially attached to each other, forming sub-groups within a larger network (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008; Newman & Girvan, 2004). There are also metrics for describing the properties of a network, for example, the pattern of nodes' degree distribution, graph density measuring the connectedness of nodes, and rich-club coefficient which indicates the existence of elite groups in a network (Borgatti, Everett, & Johnson, 2013; Scott, 2013).

This dissertation provides examples of applying social network analysis from both theoretical and mathematical perspectives. Chapter 3 approaches the research question on NGO's autonomy using network theory and finds that, although nonprofit organizations in China may lose their autonomy because of the appearance of government officials on board, these organizations still enjoy a substantial level of freedom in

an organizational network. By using advanced mathematics and statistics, this chapter also quantitatively analyzes the degree and emergence of network autonomy. From a theoretical network perspective, Chapter 4 reconsiders a classic research question in public economics — the crowd-out effect of government funding on private donations to nonprofits and proposes new perspectives considering the impact of social relations on economic behavior.

Chapter 2 The Research Infrastructure of Chinese Foundations, a database for Chinese civil society studies

This chapter provides technical details and user guidance on the Research Infrastructure of Chinese Foundations (RICF), a database of Chinese foundations, civil society, and social development in general. The structure of the RICF is deliberately designed and normalized according to the Three Normal Forms. The database schema consists of three major themes: a basic organizational profile of foundations (i.e., *basic profile*, *board member*, *supervisor*, *staff*, and *related party* tables), program information (i.e., *program information*, *major program*, *program relationship*, and *major recipient* tables), and financial information (i.e., *financial position*, *financial activities*, *cash flow*, *activity overview*, and *large donation* tables). The RICF's data quality can be measured by four criteria: data source reputation and credibility, completeness, accuracy, and timeliness. Data records are properly versioned, allowing verification and replication for research purposes.[2]

2.1 Introduction

Scholarly interest in civil society in contemporary China began in the mid-1980s, especially after the 1989 Tiananmen Incident (Chamberlain, 1993). Studies on Chinese civil society have various theoretical and practical implications, for example, the state–society relationship and the democratization process in China. However, although China is becoming an important and rapidly growing political and economic power, our knowledge about Chinese civil society remains limited. The majority of previous studies on Chinese civil society are dominated by paradigms originating in Western political philosophy or the so-called "Anglosphere" cultures (Bennett, 2007), for example, the "conflicting" paradigm, which regards civil society as a necessary power to check the state, or the "state-corporatism" paradigm, which considers civil society as a dependency of the state (Spires, 2011). However, none of these paradigms can provide sufficient explanations for understanding Chinese civil society. The lack of cultural diversity and indigenous paradigms is a major challenge but little progress has been made since the 1980s (Madsen, 1993; Salmenkari, 2013).

[2] A published version of this chapter is co-authored with: Qun Wang, Chao Dong, and Huafang Li. Author contributions: J.M. designed the database, developed the codebook and codes for geocoding, and wrote the paper. Q.W. developed the codebook, wrote the paper, and managed data quality. C.D. wrote the first draft of the technical validation section. H.L. revised the paper and promoted the database.

A major challenge for making progress on this research topic is the lack of data for empirical studies on which new theories can be built and tested. In the United States, data extracted from Internal Revenue Service (IRS) 990 Forms (Form 990, Form 990-EZ, Form 990-PF, and Form 990-N) has boosted knowledge production on civil society and the nonprofit sector. However, unlike the United States, where there are numerous institutions that provide database services to scholars (e.g., GuideStar, Urban Institute, and Foundation Center, etc.), few counterparts in China have emerged and none of them can adequately serve academic research —- the datasets are neither structured for research purposes nor easily accessible.

In responding to this critical data scarcity challenge, we built a database for studying Chinese foundations – the Research Infrastructure of Chinese Foundations parenRICF). The foundation (*jijinhui*) is one of the three organizational forms of registered NGOs. The other two are membership-based association (*shehui tuanti*) and social service organization (*shehui fuwu jigou*, formerly named as *minban feiqiye danwei*). Among these three organizational forms, foundations are the most developed organizational form and dominant civic power in China, and they are critical for strategically preserving the autonomy of civil society from state control (J. Ma and DeDeo, 2018). Empirical studies about Chinese foundations can generate important theoretical and practical implications for Chinese non-governmental organizations and civil society. For example, the board interlock analysis using RICF discovers the contingent relationship between state power and business elites, and this relationship provides empirical evidence for a new paradigm of "networked civil society" within which networked multipolar groups share power and achieve an equilibrium rather than behaving independently (J. Ma & DeDeo, 2018). A critical discourse analysis using RICF reveals that the Chinese government tends to co-opt foundations formed by firms and entrepreneurs. These foundations can generate sufficient funding from their founding firms and entrepreneurs. However, the government tends to restrict the activities of foundations that use diverse revenue strategies (Q. Wang, 2016). This differentiated control mechanism challenges the dominant "conflicting paradigm" pareni.e., state power always conflicts with civic power) in the Western world (Lester M. Salamon, 2012). A multilevel analysis using RICF suggests that the distribution of resources is highly imbalanced among foundations and that some types of foundations are more capable of mobilizing resources (Wei, 2017).

This chapter intends to help scholars understand and make the best use of RICF. It introduces the database structure, how the data is validated, the data collection procedure, and the data quality control workflow.

2.2 Methods

The database structure of RICF is designed and normalized by adhering to the Three Normal Forms paren3NFs) – a series of rules for organizing the attributes within a table and the relationships between different tables (Codd, 1970). As Figure 2.1 illustrates, the database schema consists of three major themes: a basic organizational profile of foundations (i.e., *basic profile*, *board member*, *supervisor*, *staff*, and *related party* tables), program information (i.e., *program information*, *major program*, *program relationship*, and *major recipient* tables), and financial information (i.e., *financial position*, *financial activities*, *cash flow*, *activity overview*, and *large donation* tables). The primary key (PK) in each table is a unique identifier, and the foreign key (FK) is used to establish connections between different tables. For example, the `ricf_oid` in the basic profile table is a PK that records the organizations' unique IDs, but in the program information table, it is an FK to link back to the basic profile table; therefore, while analyzing programs, scholars can use this data field to retrieve the organization's profile.

The data are crawled, parsed, and compiled manually or automatically by computer programs (Python Scrapy and other data processing packages, e.g., Pandas) from the following six sources ranked by their credibility:

S.1 Annual reports and audited financial reports. Chinese foundations are required to submit their annual reports to the civil affairs departments with which they are registered. These reports can be obtained from the foundations' or the government's official websites. The addresses of foundations' official websites are recorded under `ba_wb` in the basic profile table.

S.2 Information disclosed by supervising government departments. For example, annual filing disclosed by the Civil Organization Administration Bureau of the Ministry of Civil Affairs[3] and the Shanghai Administration Bureau of NGOs[4], among others. The Ministry of Civil Affairs[5] has a list of websites of supervising government departments.

S.3 Information disclosed by the China Foundation Database[6].

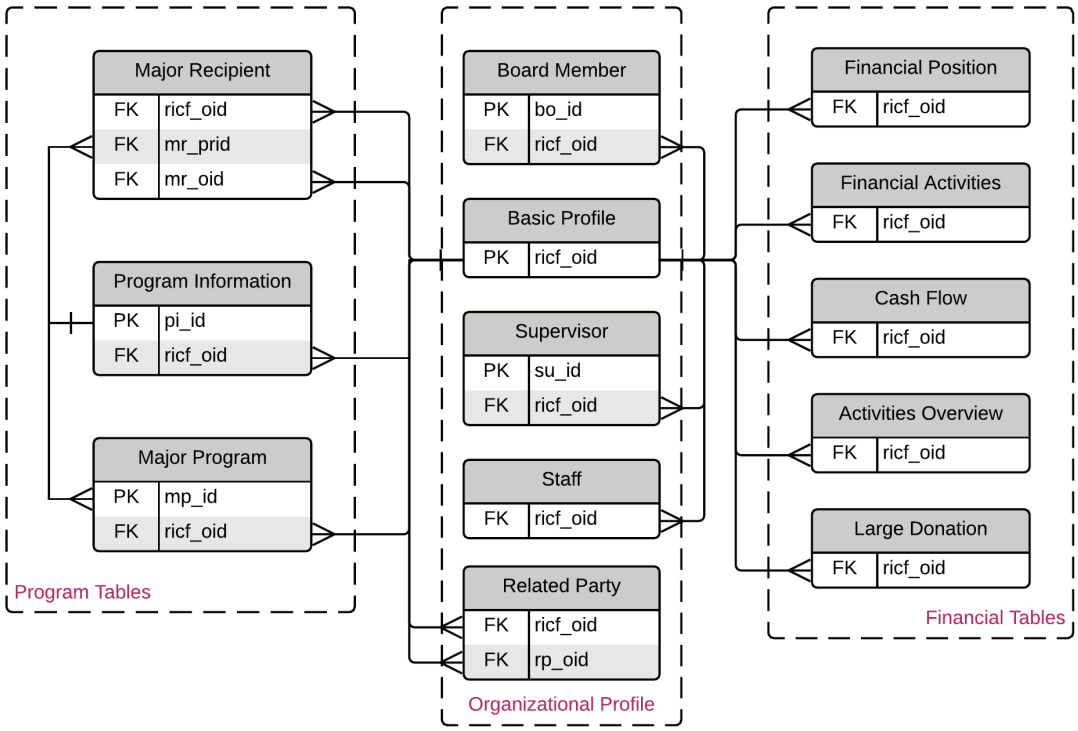
[3]http://jjh.chinanpo.gov.cn

[4]http://xxgk.shstj.gov.cn/

[5]http://www.mca.gov.cn/

[6]http://chinafoundation.org.cn; an information-disclosing platform supervised by the Civil Organization Administration Bureau, closed in early 2016 for unknown reasons

Figure 2.1: Database schema of Research Infrastructure of Chinese Foundations.



Note: PK = Primary Key; FK = Foreign Key. Only primary keys and foreign keys are listed in the Schema; refer to the codebook for complete data fields.

S.4 Information disclosed by the China Foundation Center[7].

S.5 News from the foundation's official website. The website snapshots are taken and stored under the `raw_data` folder (see Data Records section below; the same for **S.6**).

S.6 News from credible magazines or websites.

2.2.1 Code availability

The raw data are processed using Python 2.x. For users' convenience, we geocode the foundation's address using Python geocoding package Geocoder[8] and following two settings: 1) ArcGIS is preferred because of precision, and 2) the addresses not

[7]http://foundationcenter.org.cn; an information-disclosing platform run by a nonprofit organization

[8]https://geocoder.readthedocs.io

successfully geocoded by ArcGIS are recoded by Google GIS. Codes for geocoding are available at GitHub[9]

2.2.2 Data Records

The development version of the data is available at GitHub[9]. Under the root repository, we named and organized folders and files as follows:

1. Foundation data records are organized by year (e.g., folders named `2013` and `2014`). Each file represents a table in the database schema (Figure 2.1). The data files are tab-delimited and use UTF-8 encoding.
2. `codes`: this folder contains codes for particular purposes, e.g., codes for geocoding.
3. `raw data`: this folder contains raw materials from which the data are extracted, e.g., annual reports and website snapshots.
4. `RICF codebook.xlsx`: Codebook in MS Excel format.
5. `how to cite.bib`: Citation information of RICF.
6. `ricf_oid`: A Python function for looking up organization identity information (RICF unique ID, foundation name, and Unified Social Credit Code).
7. `README.md`: General instructions.

All revisions are properly logged using GitHub's version control function. Users can easily track the changes or revert to a specific version. Once we start to release the data tables of a specific year parene.g., 2013), a stable version is published on GitHub and updated on Harvard Dataverse (Data Citation; files are tagged with version names described below). The stable version contains all the repositories and files except the `raw data` and `codes` folders.

The version name is formatted as `v.Year.MajorRevision.MinorRevision` for the purpose of version control. The Year field indicates the year for which the most recent records are available. For example, `2014` means that the most recent records in this release are from 2014 and that this version also contains earlier records that date back to 2013. The `MajorRevision` field is updated when new data tables are added to the package.

In doing so, we can strike a balance between the timeliness of research and the accuracy of data. If we release a stable version only when all the data tables of a year

[9]https://github.com/ma-ji/RICF

are ready, it will not satisfy timely research demands. Moreover, scholars often use only a small proportion of the data tables. Therefore, releasing stable versions table by table instead of year by year should achieve a better balance between timeliness of research and accuracy of data. The `MinorRevision` field is updated when erroneous records are corrected.

2.3 Technical Validation

2.3.1 Data Quality Dimensions

Data quality is usually defined as "fitness for use by data consumers" (R. Y. Wang & Strong, 1996) and relates not only to the content of data but also to the way that data are utilized and whether data consumers are satisfied with using data for their purposes. The diverse nature of data quality results in many data quality dimensions derived from different needs.

Four typical dimensions have significant impacts on the goal of RICF: data source reputation and credibility, completeness, accuracy, and timeliness (Dong, Sampaio, & Sampaio, 2006). This section introduces how these four dimensions are employed to measure the extent to which RICF is reliable, complete, accurate, and timely.

2.3.2 Data Source Reputation and Credibility

Data source reputation refers to whether the data source is in high standing; credibility is the degree to which the data are considered true and credible to data consumers (Naumann, 2002; R. Y. Wang & Strong, 1996) The combination of reputation and credibility indicates whether the data can be trusted and represents the way in which the data source convinces data consumers that the data are considered to be true and credible (R. Y. Wang & Strong, 1996)

The RICF data are collected from the six different sources listed above. These sources are ranked by their reputation and credibility. When conflicts occur, the rankings will be used for the evaluation of accuracy. For instance, when a piece of information about an organization from Source **S.2** contradicts the same information from Source **S.1**, RICF uses information from Source **S.1** rather than that from lower ranks.

2.3.3 Completeness

The completeness of data in RICF is defined as "the extent to which data are of sufficient breadth, depth, and scope for the task at hand" (Pipino, Lee, & Wang, 2002, p. 212)) or "the quotient of the number of non-null values in a source and the size of the universal relation" (Naumann, 2002, p. 31)). The universal relation is that consisting of all attributes of the global schema. RICF considers three types of completeness in the design process:

1. *Schema completeness* refers to the degree to which the profiles of a source (e.g., entities and attributes) are not missing from the database schema. This type of completeness is controlled and can be evaluated by the Database Schema of the RICF (Figure 2.1).

2. *Column completeness* measures the integrity of columns in a table. It is also known as attribute completeness in the relational database. This type of completeness is controlled by the RICF codebook.

3. *Population completeness* measures the integrity of observations compared to a reference population. Table 2.1 provides two other data sources for evaluating the RICF's population completeness.

A major resource for determining and improving the schema and column completeness is the Chinese foundations' annual reports. The Regulations on the Management of Foundations(PRC State Council, 2004) requires all foundations to submit annual reports to the civil affairs departments with which they are registered. The annual reports contain three main types of information:

1. Organizational and operational profiles, including personnel, board of directors, board of supervisors, annual evaluation results, tax exemption status, etc.

2. Financial information, such as assets, donation income, and expenses, etc. The financial information should have been audited by a qualified accounting firm before submission.

3. Project summaries that report the focuses of projects, beneficiaries, and funding received and spent, etc.

Table 2.1: Population of foundations recorded by different sources: RICF, China Statistical Yearbook parenYearbook), and China Foundation Center (CFC). Sources: *China Statistical Yearbook 2017* (National Bureau of Statistics of China, 2017), *The 2014 Statistical Report of Social Service Development* (PRC Ministry of Civil Affairs, 2015), and *The CFC Independent Research Report* (China Foundation Center, 2016).

Year	RICF	Yearbook	CFC	Year	RICF	Yearbook	CFC
1981	5	NA	8	1998	535	NA	515
1982	13	NA	15	1999	545	NA	526
1983	22	NA	16	2000	552	NA	539
1984	30	NA	22	2001	568	NA	554
1985	40	NA	36	2002	587	NA	572
1986	59	NA	54	2003	614	954	597
1987	68	NA	66	2004	695	892	745
1988	96	NA	94	2005	832	975	891
1989	140	NA	140	2006	982	1,144	1,056
1990	161	NA	162	2007	1,188	1,340	1,280
1991	184	NA	185	2008	1,416	1,597	1,533
1992	264	NA	261	2009	1,665	1,843	1,826
1993	325	NA	320	2010	2,040	2,200	2,213
1994	394	NA	388	2011	2,430	2,614	2,608
1995	463	NA	453	2012	2,880	3,029	3,009
1996	502	NA	490	2013	3,344	3,549	3,627
1997	525	NA	506	2014	4,233	4,117	4,211

2.3.4 Accuracy

Accuracy refers to the closeness of a value to another value that is considered correct (Redman, 1997). Regarding accuracy, a data value must be correct and stored in a proper form parene.g., consistent and unambiguous); therefore, both the content of data and form of storage are indispensable for accuracy (Olson, 2003). RICF uses three approaches to improve data accuracy:

1. Triangulation using data from different sources. All the source files used in compiling the data are retained for reference.

2. Ranking priorities for reputation and credibility of the data sources discussed in the previous section.

3. Normalization using 3NF rules to maintain the integrity and consistency of the stored data.

2.3.5 Timeliness

Timeliness measures the extent to which the data are sufficiently timely. Two concepts are important for timeliness: currency and volatility. Currency is defined as "the age of the data when it is delivered to users." Volatility refers to "the length of time during which the data remain valid" (Ballou, Wang, Pazer, & Tayi, 1998). For instance, a grocery store may need to update the transaction data daily to generate a timely sales report and provide critical information for inventory.

Timeliness is highly dependent on the scenarios in which the data will be used. Most of the data in RICF are static data, that is, data that may not be updated during their lifetime (e.g., name of the foundation and registration number, etc.) and seldom-updated data (annual income and expenses, etc.). The volatility is long, and for our research purposes, the currency does not need to be as short as daily or monthly. Therefore, the RICF has a comprehensive update scheduled once a year, and the currency is set as one year. For example, the 2015 annual data of most foundations were released and available to us around August 2016 (i.e., data became available on foundations' websites or government's websites), and RICF then will compile and release these data one year later, that is, around August 2017.

At this stage, the four-dimension evaluations —- data source reputation and credibility, completeness, accuracy, and timeliness —- can effectively serve the research interests of Chinese foundations and Chinese civil society in general.

2.3.6 Null values

Another important issue is how to address null values, which usually indicate missing values. However, it is important to understand the reasons for missing values because it is relevant to the evaluation of completeness. A value may be missing on three occasions: 1) the value does not exist; 2) the value exists but is unavailable; and 3) it is unknown whether the value exists or not (Atzeni & De Antonellis, 1993) The word "exist" is defined here from an ontological perspective. Whether a value exists is not judged by the availability of data but rather by reasoning. While developing the codebook according to the rule of column completeness, all of the foundations are expected to have values for all the variables. Therefore, conditions 1 and 3 are not applicable to RICF. All the null values fall under condition 2.

Table 2.2: Validating data using different sources. Note: All numbers except for sample size (N) are in ten million Chinese Yuan (CNY). CFC = China Foundation Center; RICF = Research Infrastructure of Chinese Foundations.

	Total Income		Total Donation Income		Total Expense		Net Asset	
	RICF	CFC	RICF	CFC	RICF	CFC	RICF	CFC
N	2762	3136	2762	3136	2762	3124	2907	3134
Mean	1.39	1.30	1.15	1.08	1.01	0.94	3.15	3.01
SD	7.21	6.80	6.22	5.87	6.25	5.90	13.45	12.99
CI Upper	1.66	1.54	1.38	1.28	1.24	1.15	3.64	3.46
CI Lower	1.12	1.06	0.92	0.87	0.78	0.74	2.66	2.55

2.4 Validation Experiments

We did two experiments to test the validity of the data: the descriptive and regression experiments.

Descriptive Experiment. We calculated the descriptive statistics of selected varibles using one of the data sources and compared the results with RICF (Table 2.2). The 95% coefficent intervals suggest that the distributions of these varibles, although from different sources, are largely overlapped.

Regression experiments. In one of our empirical studies, we hand-coded one of the variables, that is, the number of government officials on foundations' boards (J. Ma & DeDeo, 2018). The regression results using RICF and hand-coded dataset are congruent with each other.

2.5 Usage Notes

Users may face the encoding problem of Chinese characters. All the records use UTF-8 and are tab-separated. Please pay special attention while importing files.

2.6 Data Citation

Ma, J., Wang, Q., Dong, C., & Li, H. (2017a). The Research Infrastructure of Chinese Foundations, a database for Chinese civil society studies. 00011. doi:10.7910/DVN/OTNI1L.

Chapter 3 State power and elite autonomy in a networked civil society: The board interlock of Chinese nonprofits

In response to failures of central planning, the Chinese government has experimented not only with free-market trade zones, but with allowing nonprofit foundations to operate in a decentralized fashion. A network study shows how these foundations have connected together by sharing board members, in a structural parallel to what is seen in corporations in the United States and Europe. This board interlock leads to the emergence of an elite group with privileged network positions. While the presence of government officials on nonprofit boards is widespread, government officials are much less common in a subgroup of foundations that control just over half of all revenue in the network. This subgroup, associated with business elites, not only enjoys higher levels of within-elite links, but even preferentially excludes government officials from the NGOs with higher degree. The emergence of this structurally autonomous sphere is associated with major political and social events in the state-society relationship. Cluster analysis reveals multiple internal components within this sphere that share similar levels of network influence. Rather than a core-periphery structure centered around government officials, the Chinese nonprofit world appears to be a multipolar one of distinct elite groups, many of which achieve high levels of independence from direct government control.[10]

3.1 Introduction

3.1.1 Board Interlock and State Power

When the boards of different organizations have members in common—when their boards *interlock*—they can synchronize both their values and behaviors in the absence of explicit central control (Davis & Greve, 1997; Dreiling & Darves, 2011; Fennema & Schijf, 1978; Mintz & Schwartz, 1981; Mizruchi, 1996). Organizations that share key members in this fashion can reap the benefits of network connections and solve coordination problems (Faulk, Willems, McGinnis Johnson, & Stewart, 2015; Pombo & Gutiérrez, 2011).

Board interlock is widespread in free-market societies, where it emerges in the business sector as means for coordinating decisions and building social influence (Davis,

[10] A published version of this chapter is co-authored with: Simon DeDeo. J.M. compiled the dataset, designed the study, analyzed the data and wrote the paper; S.D. designed the study, analyzed the data and wrote the paper. All numbers and theories are cross-checked by both authors.

1996). In many countries, it spans multiple sectors, and links together the nonprofit, commercial, and political worlds (R. C. Barnes, 2017; Moore, Sobieraj, Whitt, Mayorova, & Beaulieu, 2002). In the donation-based charity sector, board interlock helps coordinate of efforts and share of information (Galaskiewicz, Bielefeld, & Dowell, 2006), and enhances both a nonprofit's perceived legitimacy and its capacity to acquire resources (Esparza & Jeon, 2013). Among ethnic associations, the "broker function" of board interlock generates and spreads political trust, helping to build stronger civic communities and strengthening trust towards government (Fennema & Tillie, 2001).

Much less is known about the political implications of board interlock under authoritarian governments. For a government concerned with the dangers of independent agents, interlock may be a benefit, because the resulting coordination reduce the independence between organizations and make non-government agents easier to control. However, these benefits exist only if the government maintains control of the most central organizations in the resulting network. If it does not, board interlock may shift from an opportunity to a threat: organizations may not only reap the benefits of coordination, but now do so by coordinating around an independent agent.

Board interlock is crucial to understanding "infrastructural" forms of state power (Mann, 1984). Infrastructural power refers to the capacity of the state to act through civil society, by penetrating, and thereby influencing, its institutions. Infrastructural power is often contrasted with despotic power: the ability of state elites to act without formal negotiations with civil society, through top-down, unilateral action. The coordination enabled by board interlock provides an important means by which a state might amplify infrastructural power—or, conversely, a means by which non-governmental actors may reduce it.

The world of nonprofit foundations in the People's Republic of China provides a key test case for how a central authority confronts the challenges of an emergent network of non-governmental organizations. In short: how does an authoritarian regime deal with the counter-power that may develop when agents of a putative civil society connect together?

3.1.2 Networked Civil Society

As briefly reviewed in Chapter 1.1, researches of Chinese nonprofit sector tend to focus on how much autonomy can exist in the presence of state control(C. L. Hsu, 2010; J. Y. J. Hsu et al., 2017; Kang & Han, 2008; Q. Ma, 2002b). Previous studies have documented the strategies and tactics of individual nonprofits, either through

case studies or the identification of qualitative patterns of behavior across multiple cases (Estes, 1998; Yiyi Lu, 2007; Saich, 2000; Teets, 2013).

Civil society, however, is more than just the existence, and even the autonomy, of non-governmental organizations as individuals. It is how these organizations connect together, in a horizontal fashion, to form something more than a catalog of distinct endeavors (Salmenkari, 2013): organized "multiple overlapping and intersecting sociospatial networks of power" ((Mann, 1986, p. 1)).

To understand civil society in China, in other words, we must study not only how the state acts on individual foundations, but also how it interacts with the networks through which these foundations share personnel, information, and resources. The infrastructural power the state exercises may be both enhanced, and dissipated, by the horizontal connections between the organizations it penetrates. Board interlock is one of the primary mechanisms for this self-organization to take place, and yet we know next to nothing about how this process has unfolded, and the implications of this evolution for civil society in twenty-first century China.

We studied the Chinese state-society relationship by looking at the evolution of the nonprofit board interlock network. To do this, we draw on a large dataset of officially-registered nonprofit foundations. This dataset records not only important information about each foundation, but also the list of board members, enabling us to construct the board interlock network. Our analysis can then operate at two levels simultaneously: (1) at the level of the individual foundation, and (2) at the level of the network, where edges between foundations are defined by the sharing of board members.

At the level of individual foundations, our data show the high level of presence of government officials on foundation boards. Examination of how the number of government officials varies by working areas and foundation type shows how the presence of government officials correlates with activities, and legal status, that the government is expected to be most concerned to control.

At the network level, we find that board appointments connect together a significant fraction of legal Chinese foundations into a single network. Our results show the existence of network elites, associated with business entrepreneurs and their foundations, that form preferential ties to each other. This subnetwork appears to preferentially exclude government officials from its most central nodes, providing evidence that the network acts in part to frustrate the magnification of state control that might be expected to arise in the presence of board interlock.

The sharing of board members not only connects foundations together, it also appears to preferentially connect them into clusters: groups of nodes that, taken together, tend to preferentially connect to each other rather than the other nodes in the network. This phenomenon has been studied quantitatively by Heemskerk and Takes (2016), for the case of the board interlock network among large corporations. In that study, the authors were particularly interested to determine whether the interlock network showed either a classical "core-periphery" structure based around a single hegemon, or evidence for a the existence of a more "multipolar global order".

Such an analysis has a natural analog to the question of the extent of civil society within a nation: do foundations interlock with a government-controlled core, or do they associate into independent structures with central positions that rival that of any putative hegemonic core? We find strong evidence for the latter, detecting distinct clusters at the very center of the network. These clusters show a strong bimodaility in levels of government control, either preferentially excluding, or including, government officials. The Chinese nonprofit world is a multipolar one, with different groups at the center showing distinct relationships to government control.

Taken together, our findings suggest the emergence of a form of network autonomy that exists despite high levels of individual-level government appointments to nonprofit boards. At the same time, the association of this network autonomy with the business elite—rather than "ordinary" citizens—means that this autonomy may not lead to the kind of pluralism associated with a Tocquevillian civil society.

3.2 Methods

3.2.1 Dataset and Network Construction

Our primary dataset is the Research Infrastructure of Chinese Foundations (J. Ma, Wang, Dong, & Li, 2017b, RICF). The RICF database contains the records of the 3,344 legally-registered foundations within mainland China between 1981 and 2013. Information about each foundation is drawn from six different sources, including both official government reports and information submitted to the government, or reported on websites, by the foundations themselves. Comparing RICF's counts to other reference sources, the RICF's data appears to be at least 90% complete.

While these foundations are outnumbered by the much larger number of less formal "associations", they are the most developed form of nonprofit institution, and control just over 76% of all nonprofit funding in the nation.[11]

RICF strives to be as comprehensive as possible; it includes foundations that may, for example, may be essentially defunct. Within RICF data is a subset of foundations that have undergone an evaluation process, which rates the foundations according to a set of criteria including governance structure, financial transparency, and program effectiveness. Foundations which receive a "3A" or above (3A+) are considered to have passed this evaluation. Because the 3A+ evaluation includes checks on transparency and reporting, we expect the data associated with 3A+ foundations to be more reliable; because it also includes checks on effectiveness and governance, we expect these foundations to be more active. Comparing our analyses with the 3A+ set allows us to test for unexpected sensitivities to both data quality, and foundation activity levels, in the database as a whole.

For each foundation, RICF logs the names, gender, and date of birth of the board members. This allows us to resolve name collision and therefore construct the board interlock network: two foundations are connected when they share one (or more) board members. For simplicity in this analysis, our network is unweighted: we consider only the presence or absence of at least one shared member, and do not distinguish whether links are created by sharing presidents, secretaries, or ordinary members. Extensions to the study of weighted ties are certainly possible: one could, for example, consider weighting the edge by the number of board members shared. Such a weighting would add additional methodological complexities, however, since foundations with larger boards will have the ability to form stronger ties with each other. This may or may not correctly represent the underlying social dynamics: if two foundations with very large boards share two members, it may not make sense to represent them has having stronger ties to each other compared to two foundations with very small boards and only a single member in common. One could attempt to normalize the weights by board size; in the case, however, that the two foundations so connected have different sizes, we now have asymmetric edge weights. More sophisticated models yet could be constructed, on the basis of a probabilistic model for connection formation: for example, one could consider edge weight relative to a null model where ties are formed at random. In this analysis, for both simplicity and to

[11] The 3,344 foundations in the RICF database control approximately 35.3 billion RMB (B¥); this amounts to a large fraction of the 45.9 B¥ of nonprofit funding, tracked by the Ministry of Civil Affairs of China in 2013, for all "associations" and related classifications (Ministry of Civil Affairs of the PRC, 2014).

allow direct comparison to prior literature in other areas of the world, we follow the standard choice of unweighted edges.

The RICF data also contains the date of incorporation for each foundation, allowing us to study how the final network assembled over time. Inconsistencies in historical reporting rates and availability of data make it difficult, if not impossible, to produce an exact history of entrances and departures over time. We can, however, approximate this process by seeing how the network would have assembled if the foundation's board had remained unchanged to the present.

This is only an imperfect tracer of the more detailed question that includes both the formation of a foundation, and the ways in which the network might be altered by the addition or removal of board members. However, prior work suggests that this approximation may not be that bad. A study of nonprofits in Spain found that initial boards were usually assembled by the founders, and that while nonprofits needed a period of development to attract outsiders as potential board members (de Andrés-Alonso, Azofra-Palenzuela, & Romero-Merino, 2009), this early growth appeared to stop when the nonprofit reached maturity. A study in the United Kingdom found that the majority of nonprofit boards remained unchanged on timescales of three years, and that it was difficult for to recruit new board members (Cornforth & Simpson, 2002). Little is known about the Chinese case, however; where relevant, we draw attention to cases where "the structure at time t, given board compositions in 2015" is only an approximation, at best, to "the structure at time t, given board compositions at time t". In general, our dynamical analysis is limited to asking questions of the form "when did organizations responsible for the current trend join the system?".

3.2.2 Variables

Four critical variables help us characterize foundations at the individual level.

Public Fundraising vs. *Non-Public Fundraising.* The main legal distinctions in the Chinese nonprofit sector governs the scope of fundraising. "Public fundraising" foundations are allowed to raise money from the general public—for example, through fund drives and advertising—while "non-public fundraising" foundations may not (as shorthand, we refer to these as "public" and "non-public" hereafter). Moreover, public foundations are further constrained by geography; "central-level" foundations may raise funds at the national scale, while province-level and city-level foundations are restricted geographically. The Chinese Charity Law, effective from 1 September 2016, will nullify the distinction between public and non-public fundraising; however,

the ability of organizations to raise funds from general public will still be controlled by license issued from the state.[12]

Politically Sensitive vs. *Politically Non-Sensitive*. We supplement the RICF by hand-coding the foundations' mission statements by whether or not they are involved in a potentially controversial or politically sensitive area ("sensitive" vs. "non-sensitive"). Tracking this variable allows us to look for systematic attempts to selectively control certain topics. If a foundation has one or more of the following characteristics it is coded as "sensitive," otherwise it is coded as "non-sensitive" (Dai, 2008; Jiao, 2001; Kang & Han, 2008; Spires, 2011):

1. Involving advocacy, *e.g.*, human rights, labor issues, and environmental policy.
2. Involving international affairs, *e.g.*, programs promoting international cultural exchanges.
3. Involving religious or ethnic issues, *e.g.*, Christian activities and Tibet issues.
4. Involving the police or the legal system, or related "social stability" (*weiwen*) issues.

In order to control the researchers' bias toward coding, two assistants, who were unaware of the research purpose, were asked to independently classify foundations, solely according to the information provided in their mission statements. Discrepancies between the two assistants were finalized by a third person who is a doctoral candidate in China studies.

State Power. Our main tracker of state penetration into the nonprofit sector is the number of government officials in senior management positions. The presence of government officials on a foundation board is a clear mechanism by which the state can exercise control; at the same time the state, at least explicitly, forbids government officials from serving on these boards. Official law (Article 23) is that "principals" (the board chair (president), deputy chair, or secretary general) should not be currently employed by the state.[13]

Law against direct government involvement are commonly violated. The standard annual reporting forms even asks foundations to report the number of principals who

[12] Xinhua News Agency: NPC hopes charity law can help poverty fight, available at http://news.xinhuanet.com/english/2016-03/09/c_135172544.htm, last accessed June 14, 2016.

[13] "Regulations on the Management of Foundations" (4 February 2004), Article 23; original text available at http://www.mca.gov.cn/article/yw/shjzgl/fgwj/201507/20150700850200.shtml, see English translation at http://www.cecc.gov/resources/legal-provisions/regulations-on-the-management-of-foundations-chinese-text, last accessed 18 April 2016.

Table 3.3: Foundation status, activity, and yearly budgets (in billions of *yuan*; 1 B¥ ≈ 150 M$ in 2016) for the 3,344 foundations in our database. The majority of the foundations are concerned with neutral (non-sensitive) activities, and the majority are restricted to private fundraising. Despite the fact that non-public foundations can not raise money from the general public, they actually control the majority of nonprofit revenue in the network.

	Total Numbers		Yearly Income	
	Non-sensitive	Sensitive	Non-sensitive	Sensitive
Public	954 (28%)	356 (11%)	13.9 B¥	3.2 B¥
Non-Public	1913 (57%)	121 (3%)	17.5 B¥	0.7 B¥

are government staff; a non-negligible fraction (18%) report non-zero numbers of current government officials. As a different measure of state influence, we hand-coded the 3A+ foundations, noting whether or not the board president is a current or retired government official. Hand-coding is a difficult and laborious task; because it can be difficult to ascertain the current status of individual, our 3A hand-coding includes both retired and currently-serving government officials, and is thus not directly comparable to the self-reporting set.

We thus count the number of government officials in three different ways. The RICF counts the number of *current* government officials who serve as principals; it also counts the number of simultaneously *retired* and *senior* government officials who serve as principals; and (for a hand-coded subset) it counts the number of either current or retired government officials who serve as the board president. Note that the Article 23 law does not forbid retired government officials from serving as board principals, and these people may well still represent government influence (D. D. Li, 1998).

Registration Level. Depending on their scope of operation, foundations may be registered at the city level, the province level, or the central level. Central-level registrations enable the foundation to operate on a national scale. Registration level gives us information on both the scope of foundation operation, and also allow us to look for preferential interlocking as a function of both scope (*e.g.*, do central-level foundations preferentially connect to each other) geography (*e.g.*, do same-city registrations connect preferentially versus different-city).

Table 3.4: Government presence on foundation boards is widespread but variable. Despite explicit laws against the practice, foundations often have government officials as board principals. Hand-coding of a subset of 520 foundation presidents (left panel) shows that the practice of incorporating current or retired government officials is widespread. In both hand-coded data, and self-reports in annual filings (right panel), foundations able to raise funds from the general public, and foundations concerned with government unfavorable activities, are more likely to be controlled in this fashion.

Official or Retired-Official President (Hand-coded subset)			Official Principal (RICF)	
	Non-Sensitive	Sensitive	Non-Sensitive	Sensitive
Public	$74\% \pm 3\%$	$79\% \pm 5\%$	$34\% \pm 1\%$	$54\% \pm 3\%$
Non-Public	$41\% \pm 3\%$	$29\% \pm 9\%$	$9\% \pm 2\%$	$19\% \pm 4\%$

3.3 Results

3.3.1 Individual-Level Statistics and the Presence of State Power

Table 3.3 shows the breakdown of the foundations in the RICF data. Collectively, the 3,344 foundations in our data have a combined income of 35.3 billion RMB; approximately 5.5 billion USD at current exchange rates. Paralleling Tocqueville's accounts of the diverse initiatives of citizens in 19th Century America, foundations in contemporary China range in activity in everything from the promotion of the board game *wéiqí* (Go) to legal aid for the indigent. The majority are restricted to non-public fundraising, and work in non-sensitive areas. These non-public foundations control just over half of the total yearly nonprofit revenue in the country.

Despite laws to the contrary, our results confirm persistent and high levels of state involvement in the governance of foundations. Table 3.4 shows the relationship between fundraising scope and activity, relying on both the hand-coded 3A subsample that tracks the affiliations of board presidents, and official self-reports in the full database. Because the 3A hand-coding includes retired officials, the two methods track slightly different phenomena.

Both methods confirm that the presence of government officials is less for non-public foundations. The government is most involved in foundations that are able to raise funds from the general public. (Self-reports, but not our hand-coding, show additional supervision when the foundation itself is associated with sensitive activities. Because this signal does not appear in the hand-coded subset, it may be best-explained by differing incentives: public foundations involved with sensitive activities

Table 3.5: The fraction of nodes of each type that share board members with other foundations. The board interlock network extends to a significant fraction of all Chinese nonprofits. Both public and non-public fundraising foundations are highly integrated into the overall network, with central-level foundations able to raise from the general public the most connected of all.

	Public	Non-Public
Central	$82\% \pm 1\%$	$72\% \pm 1\%$
Provincial	$47\% \pm 2\%$	$36\% \pm 2\%$
City	$67\% \pm 1\%$	$24\% \pm 1\%$

may be more willing to report government officials on their boards, despite the fact that this violates Article 23.)

3.3.2 Board Interlock: Super-Connectors and Elites

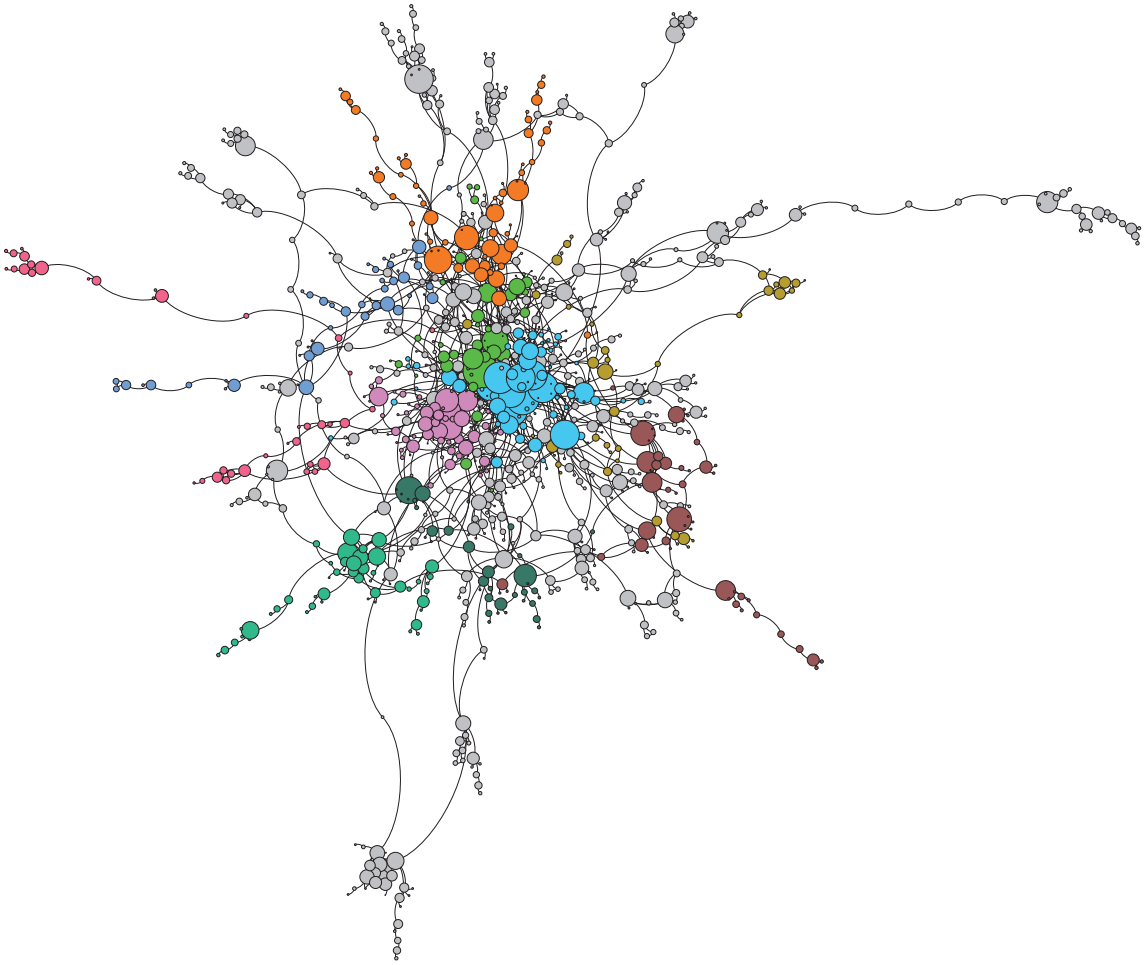
Board interlock is widespread. A significant fraction of the foundations are integrated into the network: of the 3,344 foundations, 1,411 (42%) share board members with at least one other foundation, for a total of 1,863 links. As shown in Table 3.5, foundations at the central level are the most likely to be connected. Both public and private foundations show significant network integration. A large fraction of this network connects together into a single giant component that contains 1,022 foundations (see Fig. 3.2).

While the existence of board interlock parallels the dominant corporate cases studied in the West, there are significant differences. Most notably, the network is not small world: the average path length between nodes in the giant component is 7.71, and the network diameter is 27; in both cases much larger than the corporate board interlock seen in the United States (Davis, Yoo, & Baker, 2003).

The board interlock network in Chinese foundations, in other words, has a tendency to isolate nodes from each other. Even if we restrict to the 77 central-level foundations in the giant component, the diameter remains large (9 steps); by comparison, the network of Fortune 800 firms in the 1970s, nearly ten times larger, had a diameter of five (Levine, 1977). Chinese foundations connect to each other, but the existence of these long paths shows that board interlocks are fundamentally limited in their ability to coordinate action on the very largest scales.

While the network has few shortcuts and hubs that connect otherwise distant nodes, it is also the case that a small number of foundations have very high degree—they share an unusually large number of board members with other foundations. We show the network degree distribution in Fig. 3.3. The existence of these "super-

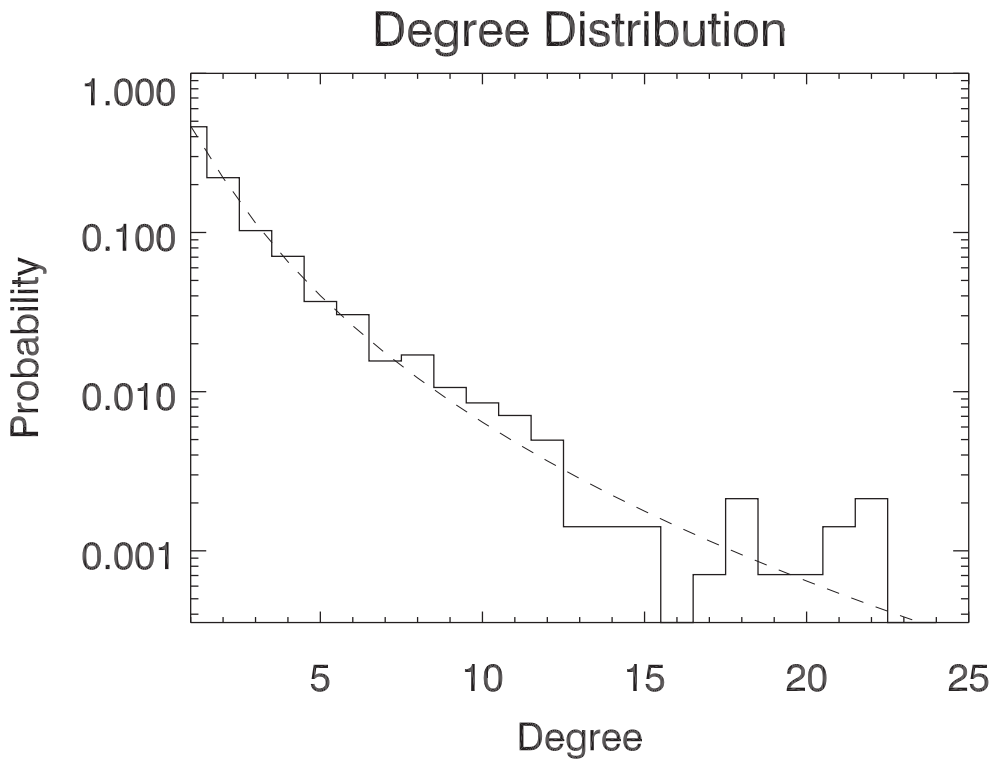
Figure 3.2: The giant component of the board interlock network, containing 1022 nodes and 1626 edges; 75% of the nodes with non-zero degree, and 30% of the full database. A simple spring loaded network layout algorithm allows us to visualize which nodes are tightly coupled to many others (end up at the center), and which are connected to the main network by only a small number of links to peripheral nodes. At the center are a small number of interlinking elite super-connectors with high degree (Fig. 3.3; Fig. 3.4). Node size is scaled by PageRank; node colors label the top ten largest clusters found using the Louvain algorithm (see Table 3.9).



connectors" can be empirically confirmed by testing for heavy-tailed degree distributions; standard methods strongly prefer a log-normal distribution to both an exponential (*i.e.*, random-graph) and power-law fit (Alstott, Bullmore, & Plenz, 2014; Clauset, Shalizi, & Newman, 2009).

These super-connectors appear to preferentially connect to each other, suggesting the existence of highly connected elite groups (the "rich-club phenomenon", first noted by (Zhou & Mondragon, 2004)). Fig. 3.4 shows the rich-club coefficient in the

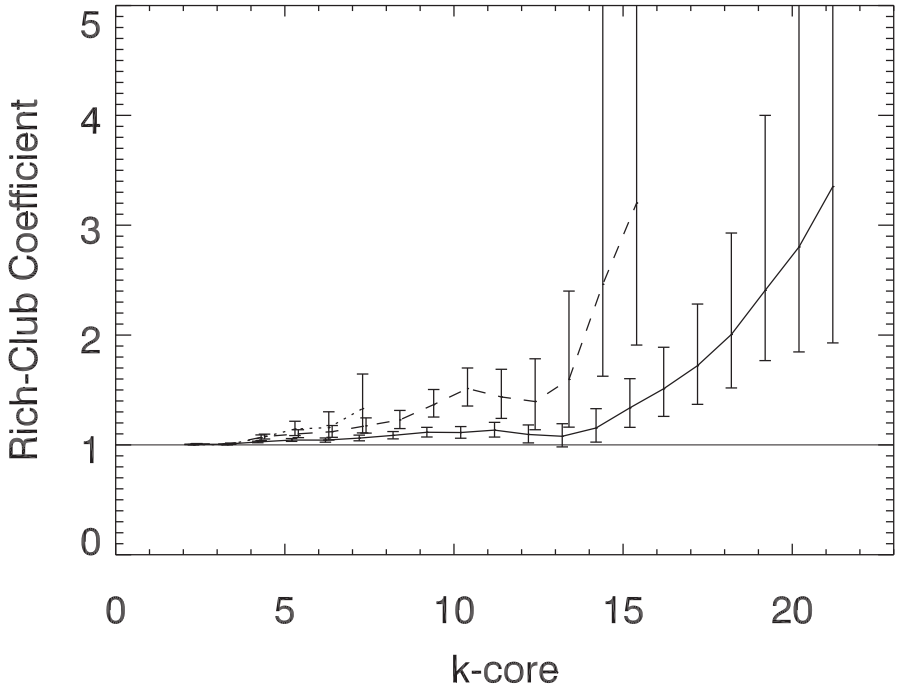
Figure 3.3: The degree distribution of the board interlock network. The distribution is log-normal (dashed-line fit), and a small fraction of the nodes have unusually high degree.



full, the public, and the non-public subnetworks. To read this figure, first follow the solid line; that this line is rising as a function of k shows that, in the full network, nodes with higher degree are more likely to connect to each other than in a null model that preserves the node degree distribution but otherwise shuffled connections. Now follow the dashed line, which considers just the internal connections of the non-public subnetwork. This line shows that this same phenomenon, seen in the full network, is even stronger here: non-public elites are even more likely to preferentially connect within this subnetwork. Finally, note the (very short) dotted line. This shows at best weak evidence for a rich-club effect when restricting to the public network. The line is much shorter, because the public network, considered in isolation, has few high-degree nodes: if a public foundation has high-degree in the full network, it is usually because it connects to non-public foundations.

If we code nodes by the board president's profession, we find that the highest degree nodes include both the government and the business elite. Of the ten highest-

Figure 3.4: The rich-club coefficient as a function of k-core. High-degree organizations ("network elites") preferentially connect to other network elites, particularly in the non-public network. This is apparent in how the rich-club coefficient grows as a function of k-core level for the full network (solid line), the public network (dotted line), and the non-public network (dashed line); 95% confidence ranges are shown. Nodes with high degree are far more likely to connect to each other, compared to a null model that preserves the degree distribution but otherwise breaks interlock correlations (McAuley et al., 2007). Taken separately, the non-public network shows a stronger rich club effect than the network as a whole. Meanwhile, the majority of high-degree links in the public network are due to cross-links with the non-public foundations; the maximal degree for the public network in isolation is much smaller.



degree foundations, six are associated with businesses, four with government. For example, the most connected foundation is the YouChange China Social Entrepreneurs Foundation, set up to encourage philanthropic giving by wealthy entrepreneurs; the second is the Forbidden City Cultural Heritage Conservation Foundation, which manages the state-owned historical treasure. The top ten most connected board members are also a mixture of both government and business elites; three are business elites, six are current government officials, including members of the National People's Congress,

Table 3.6: The number of links found between nodes of each type, compared to a degree-preserving null. Foundations in the same region, and at the same registration level, tend to cross link. Centrally-registered foundations are more than twice as likely to connect to each other than in the null; province-level foundations connect to others in the same province at rates seven times higher than the null, and city-level foundations are the most cross-linked of all, linking to other city-level foundations in the same place at rates 14 times higher than expected.

	Central	Province	City
Central	$\times\mathbf{2.1 \pm 0.1}$	$\times 0.73 \pm 0.03$	$\times 1.2 \pm 0.2$
Province (same)	—	$\times\mathbf{7.05 \pm 0.08}$	$\times 4.7 \pm 0.5$
Province (different)	—	$\times 0.42 \pm 0.01$	$\times 0.46 \pm 0.05$
City (same)	—	—	$\times\mathbf{14.6 \pm 0.9}$
City (different)	—	—	0

the CPPCC, and the Guangzhou People's Congress; and one is a retired government official.

Considering the public and non-public networks separately allows us to see how different groups dominate. In the public network, the highest-degree nodes are nearly all associated with the government: of the top ten highest degree foundations, only two have a president with a non-governmental background (a television celebrity, and the head of a hospital). By contrast, six of the ten highest degree nodes in the non-public network are associated with business elites. The highest degree node, for example, the YouChange Foundation, is run by the businesswoman Ping Wang, whose background is in international finance and law.

Board interlock is influenced by both geography and registration level; see Table 3.6, paralleling classic results for corporate networks, co-located foundations are far more likely to connect (Owen-Smith & Powell, 2004; Sorenson & Stuart, 2001; Stuart, 1998). We also find evidence for preferential connections between sensitive foundations; there are $70\% \pm 10\%$ more links between sensitive foundations than found in the null. However, public- and non-public foundations appear to intermix freely and preferences (though detectable) are weak; public foundations are only $16\% \pm 3\%$ more likely to link to each other than null, and only $17\% \pm 3\%$ less likely to link to non-public foundations.

3.3.3 Network Effects: Penetration of State Power

We next consider how the presence or absence of government officials predicts node degree. We use a multiple linear regression model, with node degree as the dependent

Table 3.7: Predictors of node degree, in public and non-public fundraising networks, and in the joint network, in a multiple linear regression. Non-public foundations preferentially exclude current government officials from the highest degree nodes, even when controlling for other variables. (z) indicates z-scored transformed real variables; all other variables are binary for presence/absence. $\star$ superscripts label significance: $\star$ ($p < 0.05$); $\star\star$ ($p < 0.01$); $\star\star\star$ ($p < 0.001$).

Independent Variable	Public Network	Non-Public Network	Joint Network
State Power			
Current Official	$\mathbf{0.17 \pm 0.08}^{\star}$	$\mathbf{-0.44 \pm 0.13}^{\star\star\star}$	-0.15 ± 0.11
Retired, Senior Official	0.0 ± 0.1	0.1 ± 0.2	0.2 ± 0.2
Legal Status			
Central Level	$\mathbf{0.72 \pm 0.15}^{\star\star\star}$	$\mathbf{0.90 \pm 0.16}^{\star\star\star}$	$\mathbf{1.6 \pm 0.2}^{\star\star\star}$
Evaluation 3A+	$\mathbf{0.33 \pm 0.12}^{\star\star\star}$	$\mathbf{0.55 \pm 0.12}^{\star\star\star}$	$\mathbf{0.66 \pm 0.12}^{\star\star\star}$
Public	—	—	-0.1 ± 0.1
Intrinsic			
Board Size (z)	$\mathbf{0.31 \pm 0.04}^{\star\star\star}$	$\mathbf{0.28 \pm 0.04}^{\star\star\star}$	$\mathbf{0.52 \pm 0.04}^{\star\star\star}$
Income (z)	$\mathbf{0.19 \pm 0.04}^{\star\star\star}$	$\mathbf{0.16 \pm 0.04}^{\star\star\star}$	$\mathbf{0.40 \pm 0.04}^{\star\star\star}$
Age (z)	-0.03 ± 0.05	0.00 ± 0.04	-0.06 ± 0.04
Sensitive Area	-0.10 ± 0.08	$\mathbf{0.33 \pm 0.16}^{\star}$	0.13 ± 0.11
	$R = 0.42$	$R = 0.34$	$R = 0.44$

variable and nine independent variables: three variables describing the node's legal status (public vs. non-public; registration level; evaluation level), four "nuisance" variables describing the intrinsic properties of the foundation (board size, income, sensitive area, and age), and two variables operationalizing the state power: (1) current government officials, and (2) retired, senior-level government officials, the two fields in the main RICF database. We consider both the full network, and the two public and non-public networks separately. The results are shown in Table 3.7.

The most surprising results concern the relationship between the presence or absence of government officials, and node degree. Foundation degree is (weakly) positively correlated with government presence in the public foundations: nodes with higher degree are more likely to have government officials. However, in the non-public network, high degree is strongly (and significantly, $p < 10^{-3}$) correlated with reduced government presence. When the two networks are joined together, the two effects compete against each other, partially canceling out. Significantly, we find no correlation for the presence or absence of retired senior officials; only the absence of currently-serving officials is predicted by node degree. To allow comparisons between different networks, we use z-score transformed data; for example, in Table 3.7,

Table 3.8: Predictors of node degree, in public and non-public fundraising networks, and in the joint network; hand-coded 3A. Use of a different, hand-coded dataset for government presence confirms the results of Table 3.7: non-public foundations preferentially exclude current government officials from the highest degree nodes. The "president official" code includes retired officials.

Independent Variable	Public Network	Non-Public Network	Joint Network
State Power			
President Official	0.06 ± 0.25	$\mathbf{-0.68 \pm 0.37}^{\star}$	$\mathbf{-0.65 \pm 0.34}^{\star}$
Legal Status			
Central Level	$\mathbf{1.06 \pm 0.26}^{\star\star\star}$	$\mathbf{1.0 \pm 0.5}^{\star}$	$\mathbf{2.6 \pm 0.4}^{\star\star\star}$
Public	—	—	-0.3 ± 0.3
Intrinsic			
Board Size (z)	$\mathbf{0.42 \pm 0.09}^{\star\star\star}$	$\mathbf{0.60 \pm 0.19}^{\star\star}$	$\mathbf{0.81 \pm 0.16}^{\star\star\star}$
Income (z)	$\mathbf{0.28 \pm 0.09}^{\star}$	$\mathbf{0.38 \pm 0.18}^{\star}$	$\mathbf{0.75 \pm 0.15}^{\star\star\star}$
Age (z)	-0.04 ± 0.09	0.0 ± 0.2	0.0 ± 0.15
Sensitive Area	-0.40 ± 0.20	0.4 ± 0.6	-0.4 ± 0.4
	$R = 0.48$	$R = 0.32$	$R = 0.44$

the presence of a current official as board principal in the non-public network shifts node degree down by roughly 0.44 standard deviations (controlling for other factors), where a standard deviation is measured for all the nodes in the non-public degree distribution.

Because Table 3.7's results rely on self-reports, it is possible that these effects may be driven in part due to differences in self-reporting. We can check for this effect by using the hand-coded 3A subset; these results are shown in Table 3.8; because the 3A hand-coding tracks only presidents, and includes both current and retired officials, our results here are not strictly comparable to the Table 3.7 case. The smaller size of this set also means that our signal-to-noise is lower. In this subset, the weaker correlation in the public data is no longer detectable, but we still see the negative correlation between network position and state presence.

3.3.4 Network Clusters: Multipolarity

Following Heemskerk and Takes, 2016, we use the Louvain algorithm (Blondel et al., 2008) to detect clustering among the foundations in the network. The Louvain algorithm groups nodes into clusters that maximize the total modularity, Q; informally, the modularity for a cluster is defined the fraction of edges within that cluster, minus the fraction of edges expected under a degree-preserving null model. When the modu-

larity is close to one, nodes in a cluster are strongly connected to each other, and only weakly connected to nodes outside. When the modularity is close to zero, by contrast, there is little evidence for the existence of clusters of nodes that preferentially interconnect.

The foundation network shows strong modularity: the average Q for the network is 0.816, and we find a total of 29 clusters. The top ten clusters by membership include just over 50% of all foundations in the network. They are shown, using different colors, in Fig. 3.2. The strong modularity of the network points to the existence of structurally independent groups, a precondition for multipolarity. However, it is possible for clusters to exist in the presence of a strong core-periphery structure: a core hegemonic cluster could be at the center of a set of more peripheral clusters. To test for this effect, we consider the average degree of nodes within the cluster, as well as the total PageRank of each cluster; PageRank provides an independent measure of network centrality, based on a random-walker model, and can be interpreted as a consensus measure of attention (Heaberlin & DeDeo, 2016) or power (Brush, Krakauer, & Flack, 2013).

The results argue for the multipolarity hypothesis. While the largest cluster has higher average degree, and larger PageRank than the others in the top ten, the effect is not strong, and power is shared remarkably evenly among the largest clusters. We can quantify this using the Gini coefficient, which for the top-ten clusters is 19%, where zero is perfect equality. Put another way, the distribution of PageRank among the top ten clusters is more equal than the famously egalitarian income distribution in Denmark (Gini coefficient 25% (Central Intelligence Agency, 2018)), and far less than seen in PageRank distributions found in networks among pages in the world-wide web (Heaberlin & DeDeo, 2016). The existence of multiple clusters with high degree and high PageRank is consistent with the rich club effect found above: these highly central clusters preferentially link within themselves.

Finally, for each cluster, we compute the fraction of nodes within the system that have government officials on the board. This allows us to test whether or not the clusters are defined by characteristic levels of government involvement. For the top ten clusters, we find strong evidence for bimodality in levels of government control. Clusters are much less likely to show "average" levels of government presence on boards, and tend to either extreme, either strongly excluding government officials, or having far more than expected given the base-rate. Cluster-by-cluster in the top ten, we have four cases where rates of government presence are either anomalously high, or low, at the $p < 10^{-3}$ level, and two more at the $p < 0.05$ level. The largest and most

Table 3.9: Size (in nodes), average degree, total PageRank, and rates of government presence on boards, in the ten largest clusters of the foundation network. Network power, as measured by PageRank, is shared reasonably equally among the clusters. Six of the ten networks show anomalously high or low levels of government presence compared to the baseline rate of 17%.

Cluster	Size (Nodes)	Average Degree	PageRank	Government Presence
1	91	5.4 ± 0.6	11%	**2.1**%*** **(low)**
2	68	3.3 ± 0.4	7.0%	**2.9**%*** **(low)**
3	66	3.9 ± 0.4	6.5%	11%
4	55	4.3 ± 0.6	5.7%	15%
5	53	2.7 ± 0.4	5.2%	**30**%*** **(high)**
6	50	3.1 ± 0.4	5.1%	16%
7	46	2.6 ± 0.2	4.2%	24%
8	43	2.9 ± 0.3	4.0%	**28**%* **(high)**
9	39	2.7 ± 0.2	3.7%	**28**%* **(high)**
10	38	2.6 ± 0.4	3.5%	**34**%*** **(high)**

central cluster of all has the lowest rates of government presence: 2.1%, eight times lower than the expected (null) rate of 17%. The existence of these extreme values in either direction allow us to reject the null hypothesis—that rates of government presence are independent of cluster membership—at $p \ll 10^{-6}$ in the standard Fisher test. A Bayesian model, which explicitly models clusters as draws from one of two binomials with different values for the probability of government control, is strongly preferred over a single binomial distribution at similar levels. These relationships are shown in Table 3.9.

Taken together, these results suggest that the foundation network is a fundamentally multipolar structure, where clusters have roughly equal levels of network power and are subject to distinct levels of government control. These clusters are further defined both by geography (since foundations with provincial or city-level registrations tend to strongly associate, see Table 3.6) and public/non-public status.

3.3.5 Longitudinal Analysis: the Emergence of Autonomy

How did these network effects evolve over time? Because board membership changes over time, a full answer to this question would require knowledge of the dates of both joining and departure for each member. In the absence of this information, we can conduct an analysis of the evolution of this network using the board compositions observed in 2015. This amounts to a longitudinal analysis of civil society growth rather than a direct study of network dynamics since we expect, particularly for

the older organizations, some changes in board composition due (at the very least) to retirement. While this is, on short timescales and under the assumption that most organizations have relatively stable compositions year to year, a potentially good approximation, such an analysis is better understood as answering the question "when did the organizations responsible for the current structure join the network".

Fig. 3.5 shows the three critical metrics over time, under these assumptions: (1) the size of the public and non-public network over time; (2) the changing levels of government presence on boards; and (3) the evolution of the node degree–government presence relationship.

Overlaid on these panels are five critical dates in the recent history of the nonprofit sector: (1) 4 June 1989, the Tiananmen Square protests, and the emergence of civil society in China (Q. Ma, 2002b); (2) 15 September 1995, the Fourth World Conference on Women, associated with the accelerating development of civil society in China (Q. Ma, 2005); (3) 1 June 2004, the day the Regulations on the Management of Foundations, including the above-discussed Article 23, took effect; (4) the Sichuan Earthquake of 12 May 2008, according to Shieh and Deng, 2011, a critical date in the expansion of the nonprofit sector's horizontal linkages; and (5) the 12th Five-Year plan for 2011–2015, introduced March 2011, which devoted a full chapter to "social management innovation" as a key government target. Fig. 3.6 shows the same plots, but now for the 3A+ hand-coded subset, as discussed above.

Significant numbers of non-public foundations appear soon after the Tiananmen Square protests, though none of the foundations from that year retain 3A+ status today. The effect of the 2004 Regulations on the growth rate is clear: for at least the next five years, it led to literally exponential growth in the number of both public and non-public foundations. The growth rate in the non-public sector was significantly stronger, so that, by 2011, the non-public sector was larger than the public one.

The effect of these same regulations on the levels of government supervision is more complex. The 2004 regulations meant that new organizations reported lower levels of government principals in the non-public network. This is consistent with new foundations becoming aware of, and responding to, the restrictions of Article 23. This decline does not appear as strongly in the 3A+ hand-coded subset, however, which suggests one of two explanations: that new foundations are continuing to include government officials, but staying within the letter of the law by including only retired officials, or, that new foundations are continuing to include currently-serving government officials, but under-reporting their presence in official paperwork. The effects of Article 23 are inconsistent: the decline in reported government presence does

Figure 3.5: Network evolution over time. As the non-public network grew (top panel), it reported lower levels of government presence (middle panel); this contrasts with the growth of the public network which began to report increasing levels of government presence in the same period. In the years after 2008 (see text), the formation of new nonprofits leads to the emergence of a detectably negative relationship between node degree and government presence in the non-public network (bottom panel): the highest degree nodes now appear to preferentially exclude government presence.

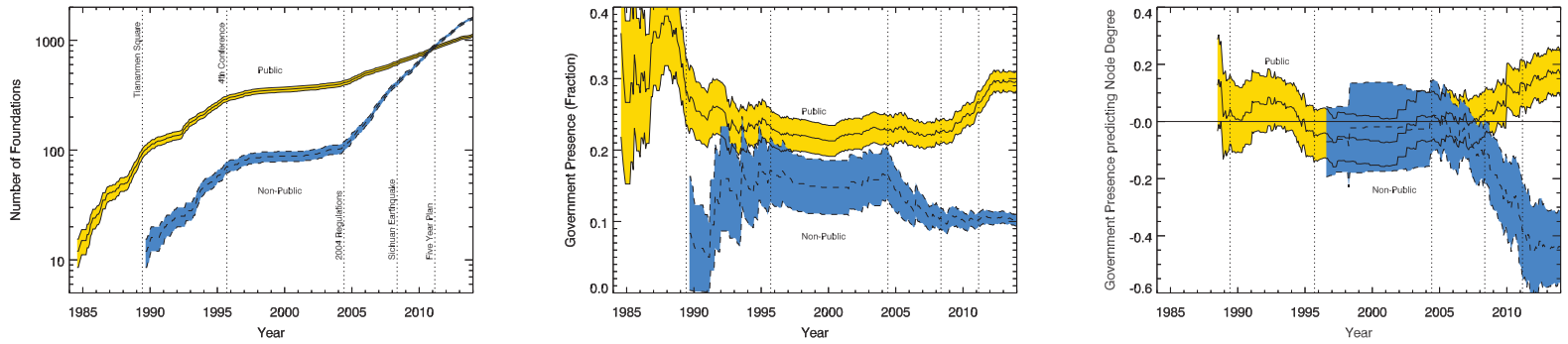
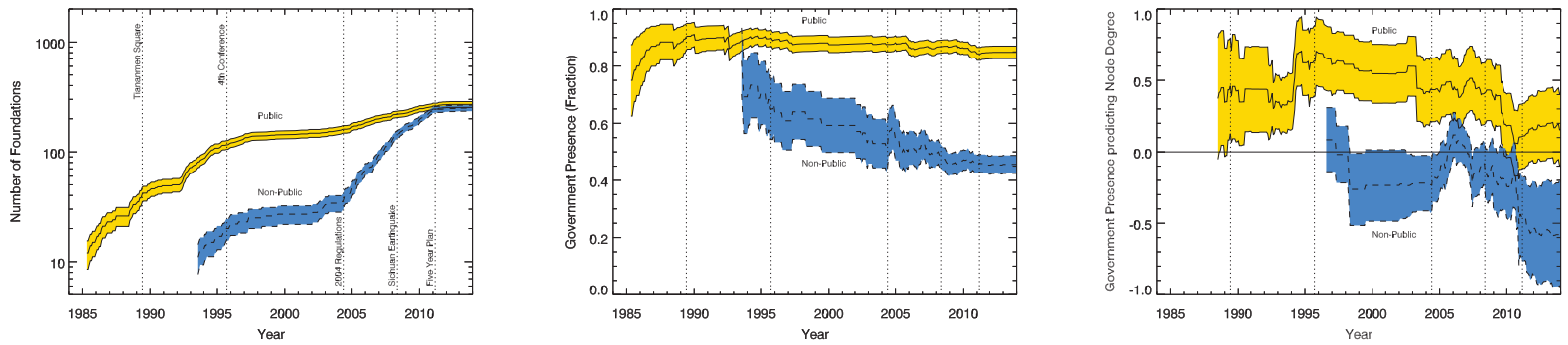


Figure 3.6: Network evolution over time; hand-coded 3A+ subset. Differences in overall levels of supervision are do both to reporting effects, and the necessary inclusion of retired officials in this set. Despite these coding differences, we see the same emergence of elite autonomy signal (bottom panel) as in the full network; here the signal becomes detectably negative after the introduction of the 2011 "Five Year Plan".



not occur in the public network; indeed, after 2008, reported government presence starts to rise.

Most interesting are the effects of network growth on the relationship between node degree and government presence. In both the full network, and the 3A+ hand coded subset, we see that organizations responsible for the current negative relationship between degree and government presence joined only late in the network history. Today the non-public network acts to systematically exclude government officials from high degree nodes. In the full network, the negative relationship becomes strong enough to detect soon after the Sichuan earthquake. In the 3A hand-coded subset, the downward trend towards increasingly negative relationships between degree and government presence becomes detectable only after the 2011 Five Year Plan.

3.4 Discussion

Our quantitative work here confirms the unusual nature of the state-society relationship in contemporary China, one that appears to give significant network powers to independent, non-governmental agents. There are high levels of network clustering and autonomy, and a strong, inverse relationship between network centrality and government supervision. The world of Chinese nonprofits is not simple one of command-and-control, where governmental agents dictate by direct presence the actions of the most important players in the network. The nature and strength of these ties may allow for the kinds of decentralized decision-making and policy influence seen in a recent qualitative study of civil society organizations in the country (Teets, 2017).

At the same time, our analysis shows that these foundations are hardly a free-wheeling sector beyond the reach of government power. Our most basic results confirm the persistent and high levels of state presence throughout the nonprofit world. The appointment of government officials to high-level positions on foundation boards means that the government continues to hold significant levels of direct influence. In Tocqueville's account of civil society in the 19th Century United States, citizens formed voluntary associations independent of the government itself. Whatever they are doing, the nonprofits of 21st century China are far from this 19th Century model, and far, also, from models of post-Soviet democratization in Eastern Europe (Walzer, 1992). Our quantitative results fit with what is widely seen in case studies and field-work in China itself: state power may not be complete, but it cannot be ignored.

3.4.1 Incomplete Control

Our results show significant differences in the level of governmental penetration of the nonprofit sector. This is most apparent among the non-public foundations where, at least officially, only one in ten foundations have a current government official as board principal. The government's relationship to its foundations is bimodal, with public foundations showing the highest levels of government involvement; not surprisingly, of this more supervised group, the public foundations engaged in politically-sensitive topics receive the greatest levels of supervision of all.

The unusual nature of these less-supervised, non-public foundations becomes apparent at the network level. A set of network elites are at the center of the non-public network. These elites not only serve as hubs for large numbers of other foundations, but preferentially connect to each other. Examination of the profiles of the highest degree nodes shows that, in a parallel to the United States (Moore et al., 2002), the nodes responsible for these interconnections are, primarily, the business elites.

Detection of this rich club effect provides a new view on the development of horizontal relationships that can enable communication and cooperation—a process captured in fieldwork studies of horizontal connections during the 2008 Sichuan Earthquake (Shieh & Deng, 2011), and a missing piece for understanding the development of state that increasingly devolves government functions to non-government agencies (Saich, 2000).

That business elites play such a central role in the NGO network fits with recent work that shows an increasing importance of non-corporate venues as corporate networks fragment (Carroll, 2010; de Graaff, 2012; Domhoff, 2009). Our results go beyond a simple demonstration of elite homophily, however, in showing how elites in an authoritarian regime manage relationships with government officials.

In particular, our network analysis reveals an unexpected negative relationship between node degree and government presence in the non-public network. Not only is government penetration much lower overall in the non-public foundations, it appears to have even less penetration to the foundations at the network's center. Horizontal relationships between foundations appear to selectively exclude the top-down "vertical" control of the state in a form of structural autonomy.

These horizontal relationships are arranged in such a way to create a multipolar structure at the heart of the foundation network. Rather than a set of core-periphery relationships, the network's high levels of clustering suggest that the world of Chinese NGOs is fundamentally multipolar (Heemskerk & Takes, 2016). Distinct clusters appear to share central places in the network, and the largely equal share of network

power given to each cluster means that there is little evidence of a dominant hegemon to which all other clusters uniquely attach. What inequality in network power exists appears, if anything, to be associated with reduced levels of government presence: the two largest clusters in the network have significantly lower levels of government presence than expected.

3.4.2 Emergence of Elite Autonomy

A dynamical analysis of network formation, shows how recent the creation of this partially autonomous sphere has been. Negative relationships between network power and government control appeal soon after the 2008 Earthquake (the downward trend in the 3A subset appears around this time as well, but only becomes statistically significant in 2011). This result lends new support to Shieh and Deng's (2011) qualitative study which associated the earthquake to lasting cultural, political, and social changes in the nonprofit world that led to new forms of autonomous civil society. Zhang, Rezaee, and Zhu (2010) support these results from a different angle, suggesting the increasing importance of private, as opposed to state-controlled, organizations in nonprofit relief. In a comparative of study of how government-controlled and private firms responded to the 2008 Earthquake, they found that private firms donated to relief more rapidly, and at greater levels of financial assistance, that state-owned firms. Even many years after the 2008 Earthquake, these effects persist.

One more recent political change comes from the government: the promotion of "social management innovation" (*chuangxin shehui guanli*), a core concept of state policy first introduced in the 4th Plenum of the 16th CCP Congress in 2004 (Pieke, 2012; Schlæger & Jiang, 2014); the 12th Five-Year plan for 2011–2015 elaborated the policy as a governance target, proposing "party leadership, government responsibility, societal cooperation, public participation" as key principles (**translation**), the use of civil society to provide social services, and a correspondingly less rigid approach to controlling it (Shan, 2013). Our results confirm the impact of these further reforms: in the post-plan era, the negative relationship between government presence and node degree has persisted.

Crucially, our data does not include the so-called "grassroots", or illegal NGOs that, while tolerated by the state, operate without legal sanction (Spires, 2011). These NGOs sometimes include Communist party members on staff, are largely tolerated by the state and often seen as socially legitimate organizations, and often provide essential services in cases where the state can not. Despite their technical illegality, government officials sometimes even lend explicit support to their mission. This qual-

itative work further suggests that members of illegal NGOs are largely uninterested in organizing independently in ways that might appear to threaten the state. Taken at face value, these suggest that were data on the staff or board members of illegal NGOs to be incorporated into our networks, we would find them in a core-periphery relationships to the officially-sanctioned actors we study here.

3.4.3 Civil Society and the Meaning of Network Connectivity

Network connectivity is associated with the ability to form common knowledge (Chwe, 1999), and both simulations and theory suggest that nodes of high degree play a crucial role when common knowledge is required for joint action (Liddell & DeDeo, 2015). The negative relationship between node degree and government presence observed in our data then amounts to a form of structural autonomy. Taken at face value, these results seem to suggest that foundations within this non-public subset may be part of the emergence of a new civil society, whose interlocks occur increasingly independently of the state, and whose resultant capacity for independent coordination might even be seen as a threat to authoritarian control.

The identification of these links with a Tocquevillian civil society is complicated, however, by the fact that when the most connected of the non-public foundations are not government in origin, they appear, instead, to be drawn from the business elite. The extensive ties between the state and business then suggest that this civil society is something less than might be expected; ever since the reforms of the 1980s, scholars have suggested that the business elite act as an agent of the government itself (Pearson, 1997).

Indeed, this provides a clear alternate explanation: if the highest degree nodes are sufficiently aligned with the government to begin with, they can be allowed to operate without direct supervision—precisely as we see in our data. Whether or not the elite are truly independent of the government, their special position in society, and their ability to influence the government financially (D. Ma & Parish, 2006) suggests that this civil society, such as it is, is far from the pluralist Tocquevillian world of the ordinary citizen. Understood in this context, and with the caveat that our work here is able to cover only the official NGOs, and not the illegal sector, these results are perhaps more consistent with the theory of "consultative authoritarianism" (Teets, 2013), in which the government tolerates increasing levels of autonomy among non-governmental organizations while developing new strategies of indirect control. Networks of state power may overlap with ones defined by economic exchange, but need not be coextensive (Mann, 1986).

Our results show that the government has come to tolerate communities of interlocking associations that operate with lower levels of direct government presence. Today, the total number of these organizations is small. The new Charity Law, effective from 1 September 2016, allows a far greater number of associations—potentially in the hundreds of thousands—to raise funds from the general public. We expect the rapid expansion in both the size and scale of the Chinese nonprofit sector will radically increase its impact on the state-society relationship.

3.4.4 Networked Civil Society and Multipolar Structure

Finally, our cluster analysis suggests that the social actors in civil society are organized into larger clusters by horizontal relationships, and arranged in such a way to creature a relatively equal relationship between the most important clusters in the network: a multipolar world (Heemskerk & Takes, 2016) of Chinese NGOs. Distinct clusters appear to share central places in the network, and the equal shares of network power given to each cluster is very different from a system with a dominant hegemon to which all other clusters uniquely attach.

The clusters are not perfectly equal in network power. The inequality in network power that does exist appears to be associated with reduced levels of government presence: the two largest clusters in the network have significantly lower levels of government presence than expected. This result, concerning the most powerful clusters of individual nodes, parallels the results on elite autonomy among the nodes with greatest network power on the individual level.

By allowing these more egalitarian, more horizontal structures to emerge—and, further, by allowing the most important of these structures to operate with increased independence from central monitoring—the state may have made it possible for organizations to make more efficient use of local and distributed knowledge (von Hayek, 1945). The patterns in which these new structures arrange themselves call to mind classic theories of decentralized decision-making in liberal societies that draw attention to autonomous, spontaneous, and "polycentric" orders (Polanyi, 1951; von Hayek, 2011). At the same time, persistently high levels of state involvement in the sector frustrate a simple analogy to descriptions of liberal states. Our account of Chinese civil society here, in terms of the simultaneous presence of both horizontal (group-to-group), and vertical (group-to-state) linkages, and the structural tensions between the two, finds parallels in recent work on collective action in rural China (Yao Lu & Tao, 2017), which identifies a new class of "semi-integrated" organizations that can mobilize both horizontal and vertical linkages at once.

Remarkably, the Chinese government does not appear to be combating the emergence of a potential civil society counter-power either through direct monitoring, or through disruption of network ties. There is plenty of evidence that individual foundations in the official Chinese nonprofit sector today are relatively tame, with a strong tendency to align their goals with that of the state (Teets, 2013). Yet the underlying network structures that these organizations have implicitly created have the potential to enable more independent action and decision-making than one would expect; they are certainly very far away from the highly centralized social structure and planned economy that characterized mainland China during Mao's rule. Our work suggests that the government will either increasingly employ less-visible strategies of control, or, conversely, come to accept the delivery of social and economic needs through a rapidly-growing, complex, and increasingly autonomous sphere.

Acknowledgments

J.M. thanks Dr. Zhaonan Zhu and Bin Chen for assistance with coding; Qun Wang and the RICF data quality team for data collection and data quality control. S.D. thanks the Santa Fe Institute and the Alan Turing Institute for their hospitality while this work was completed. We thank Dr. Peter Frumkin and the 2016 Penn Summer Doctoral Fellows Program fellows, Dr. Richard Steinberg, Dr. Lehn Benjamin, Dr. Bin Chen, Dr. Xinsong Wang, Xunyu Xiang, Xiaoyun Wang, Bradi Heaberlin, and Torrin Liddell for their valuable comments. The RICF project is supported in part by the Dunhe Foundation.

Chapter 4 Funding nonprofits in a networked society: Two modes of crowding mechanism of government support

This chapter studies the impact of social relations on organizational and individual economic behavior in the crowding process of government funding–the effect that government funding to nonprofits may crowd out or crowd in private donations. By using a novel panel dataset across 12 years, this study tests two modes of crowding mechanism considering the impact of social relations: compensating mode and amplifying mode. Analysis suggests that, although government funding to a nonprofit may crowd out the private donations to the same organization, private donations are not reduced but redistributed to other nonprofits in the organizational network. Our findings support the compensating mode and the importance of social relations in resource distribution. Policy and practical implications are discussed.

4.1 Introduction

Government funding to nonprofits intends to increase the provision of under-provided public goods or services. However, theoretical studies find that the government funding may crowd out private donation: for every dollar increase in government funding, the private donations may decrease by one entire dollar or less (e.g., Abrams and Schmitz, 1978; Andreoni, 1989, 1990; Roberts, 1984; Warr, 1982). A common theoretical hypothesis for these studies is that the donors may see contributions to public goods through taxation as substitutes to the private donations to nonprofit organizations. The crowd-out effect of government funding is one of the most important inquiries in public economics because it is critical to the government and policy makers in providing optimal goods and services: government spending is useless if the crowding out effect on private donations is by one entire dollar.

A considerable number of empirical studies made the efforts to understand the crowd-out effect since the 1980s, but the academic community still has no consensus on the size and direction of crowding out. Scholars usually use four types of research methods on this topic: laboratory experiments, survey experiments, archival data from tax return forms, and micro-level survey data (de Wit & Bekkers, 2017, p. 302). The research methods have strong effect on the results, for example, laboratory experiments consistently found large crowd-out effects with an average of 64% decrease of private donation[14], while the average effect found through non-experimental meth-

[14] A very recent and innovative research used social media to run experiments within a naturalistic context, and found no evidence supporting either crowd-out or crowd-in effect (Jilke, Lu, Xu, & Shinohara, 2018).

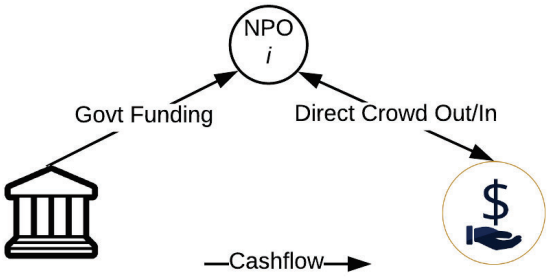
ods is a 6% increase (de Wit & Bekkers, 2017, p. 309). In general, two-thirds of previous estimates support the crowd-out hypotheses, while one-third are against the hypothesis and support the crowd-in effect (de Wit & Bekkers, 2017, p. 311).

Two types of methodological problems reside in previous empirical studies (Ribar & Wilhelm, 2002, 437–438). First is the mismatch between private donations and government support using data extracted from tax returns or general surveys, and this issue was solved by using data compiled on an organization-by-organization basis in later studies. The second problem results from omitted variables, that is, the government funding and private donations may be jointly determined by some unobserved variables (Payne, 2009, pp. 163–164; Steinberg, 1985, p. 62). For example, people who are more altruistic are likely to both give more and vote for higher levels of government provision and support.

The issue of omitted variables still is one of the most challenging problem when estimating crowd-out effect. The use of panel data and fixed effect analysis is one solution. For example, the time or organization fixed effect analysis can address the problem of omitted variables that are time or individual invariant. Even though, this approach cannot exhaust all omitted variables, for instance, the changing preference of government officials can be captured by neither time nor organization fixed effect. Another practice is using instrumental variables (or instruments for short) in two-stage least square (2SLS) analysis. Good instruments must strongly predict government funding and do not directly predict private donations. In the first-stage estimation, government funding is predicted by the instruments, and then in the second-stage analysis, the fitted values of government funding are used to evaluate the crowding out effect on private donations. The quality of instruments can be evaluated by statistical tests, but a convincing argument explaining why the instruments are good is critical (Payne, 2009, p. 165). However, instruments used in existing studies can hardly be convincing (Ribar & Wilhelm, 2002, p. 438).

Other than the methodological problems, the theoretical setting is also limited: many of previous studies are inherently flawed for not considering "the problem of embeddedness." Economic behaviors are often understood from an "under-socialized" or atomized perspective, that is, actors are atoms outside a social context and driven by self-interest. But the social structures in which the actors are embedded also constrain the economic behaviors — the "problem of embeddedness": Economic behaviors are "embedded in concrete, ongoing systems of social relations" (Granovetter, 1985). But existing studies on crowding out/in only consider the government funding and private donations directly made to the same nonprofit i (Figure4.7). A recent

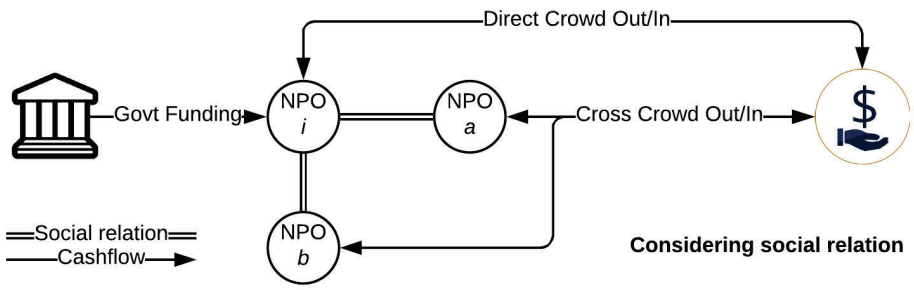
Figure 4.7: Existing studies not considering social relations.



paper on crowd-out examined the social relations in donors' networks using numerical experiments (Chih, 2016). This paper found that the crowd-out effect of government funding is less intense on donors who are more embedded in the social networks because the social norms that encourage private donations are stronger for these people (Chih, 2016, p. 84). Unfortunately, no empirical study using real-world data has been conducted to examine the impact of social relations on the crowding effect.

By tracing the activities of more than four thousand charitable Chinese foundations over twelve years, we compiled a novel and high quality panel dataset with over 17 thousand observations. Although unbalanced overall, the dataset has 3,147 foundations with at least 3 observations. This study contributes to the literature from three aspects. First, the social relations between organizations may result in "cross-crowding" effect, that is, private donations to organization i may be influenced by the government funding to i's neighbor organizations a and b (Figure 4.8). Second, the impact of network embeddedness on private donation is examined, that is, foundation's network position may also influence private donation. Third, we study one of the largest countries in the world, People's Republic of China ("China" hereafter), which has never been examined on this topic before. Almost all the existing studies on this topic use data from Western countries (de Wit & Bekkers, 2017, p. 303), but we know nothing about China. Given the specific state–society relationship and popularity of government–nonprofit social service contracting (J. Ma & DeDeo, 2018; Zhao, Wu, & Tao, 2016), this study extends our knowledge on this topic to authoritarian countries and generate important implications for policy. The first and second contribution introduce a new network perspective for understanding the crowding process, rendering private donation as an imperfect substitute to government funding.

Figure 4.8: Studies considering social relations.



4.2 Research Questions and Operationalization

4.2.1 Why Social Relation Matters: Board Interlock and Institutional Isomorphism

Board interlock refers to the practice of sharing board members between organizations. In a board interlocking network, nodes represent organizations, and two nodes are connected if they share one or more board members. The values, information, and decisions can be diffused among the boards through the shared board members. Because of board's important role in governance, the board interlocking network has long been a research interest of scholars from different academic disciplines. Although critics remain, studying such network is a valid approach to understanding the organizational behavior embedded in social relations. See Davis (1996) and Mizruchi (1996) for reviews and critiques to board interlocking studies.

According to new institutionalism, the organizations connected by board interlocking relationships can be *isomorphic* in numerous ways because these relationships provide perfect channels for the three isomorphic processes to happen: coercive, mimetic, and normative (DiMaggio & Powell, 1983, p. 150). *Coercive isomorphism* is a result of both formal and informal pressures, for example, foundations are expected by society to lower their administrative cost and required by law to disclose their financial reports in a standardized format. The board as governance body has the right to enforce these requirements, and board interlocked organizations are more likely to enforce the same requirements. *Mimetic process* results from the responses to environmental uncertainty, for example, new foundations may mimic the operation of well-established forerunners in the same field, or even invite their board members, to reduce the risk of uncertainty and secure more resources. *Normative pressures* are because of professionalization, for example, board interlocked organizations are more likely to share standards of services and operations.

Empirical study has suggested that the boards of nonprofits have critical roles in sharing information and coordinating organizational strategies within the organizations, they can also shape external donors' perceptions of the organizations (Faulk et al., 2015). Because the boards can be isomorphic through board interlocking relationships, these isomorphic boards may be able to influence nonprofits' revenues and donors' decisions of giving. For example, for individual donors, organization a can be a good alternative to its isomorphic organization i if they are board-interlocked, and the isomorphic boards can redirect donors' giving from i to a if the board members perceive the former has received abundant government funding. Such theoretical assumption which we know nothing about leads to our research hypothesis: the two modes of crowding mechanism.

4.2.2 Considering Social Relation: Two Modes of the Crowding Mechanism

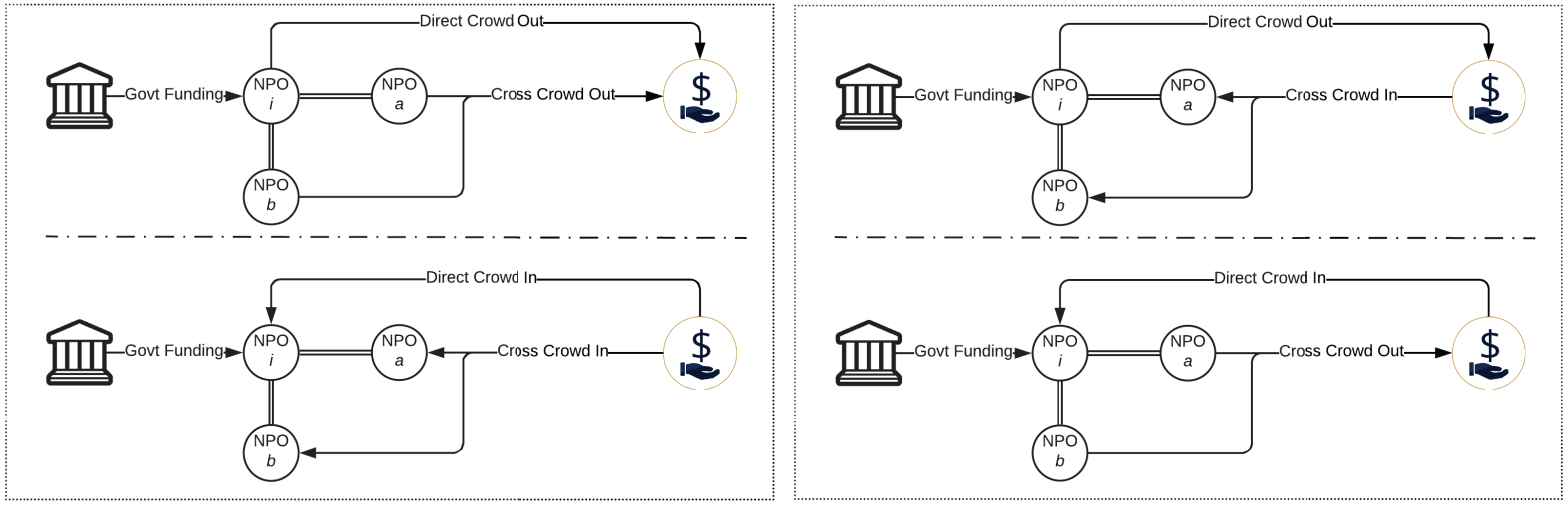
Considering social relations between organizations, we can hypothesize two modes of crowding mechanism: the amplifying mode and compensating mode (Figure 4.9). If the direct and cross crowding effects are in the same direction, then the crowding effect is amplified and therefore named as "amplifying mode." For example, government funding has a direct-crowd-out effect on nonprofit i and cross-crowd-out effect on isomorphic nonprofit a and b. By a similar rationale, if the direct- and cross-crowding effects are in different directions, these mechanisms are labeled as "compensating mode."

According to the two theoretical modes of crowding mechanism and interest in network embeddedness, we propose two research questions: 1) What are the direct- and cross-crowding effects of government funding on private donations? 2) Does network embeddedness have impact on private donations? The basic setup for answering the two questions is the following equation:

$$\begin{aligned} Donations_i = &\alpha + \beta \cdot GovFund_i + \gamma \cdot NbrGovSum_i + \delta \cdot NetEmbed_i + \\ &\omega \cdot Controls_i + \mu \cdot Controls_r + \varepsilon_i \end{aligned} \tag{4.1}$$

Private donation to organization i ($Donations_i$) is regressed on the amount of government funding to i ($GovFund_i$), the weighted sum of government funding to i's neighbor foundations ($NbrGovSum_i$; defined by Eq. 4.2), a set of variables measuring i's network embeddedness ($NetEmbed_i$), and a set of control variables at organiza-

Figure 4.9: Two modes of crowding mechanism: amplifying and compensating.



(a) Amplifying mode

(b) Compensating mode

tional level ($Controls_i$) and regional level ($Controls_r$)[15]. The coefficient β, γ, and δ measure the direct-crowding effect, cross-crowding effect, and network position effect, respectively.

$$NbrGovSum_i = \sum_{j \in d(i)} (GovFund_j \cdot Isomo_{ij}) \tag{4.2}$$

In Eq. 4.2, $d(i)$ is a set of neighbor organizations that are directly connected to i through board interlocking relationship. By summing the weighted values of government funding to j where $j \in d(i)$, we have the total amount of government funding to i's neighbor organizations. We only consider the first-degree neighbors in this study. Although the influence of indirect connection is possible, we expect the effect is small and save this for future study. The correlation between direct government funding and neighbor government funding is weak ($r = 0.24$), suggesting the two variables are not collinear.

The weight $Isomo_{ij}$ measures the similarity of board between organization i and j, and is calculated by Eq. 4.3 in which $BoardShare_{ij}$ is the number of board members shared by i and j, and $PooledInd_{ij}$ represents the number of pooled individuals from the boards of the two organizations i and j:

$$Isomo_{ij} = \frac{BoardShare_{ij}}{UniqInd_{ij}} \tag{4.3}$$

The sum of neighbor government funding is weighted because of the "isomorphousness" between organizations. Board interlocking relationships can vary in diffusing information and coordinating. For example, organization i and j are more capable of sharing information and being isomorphic because their boards are largely overlapped, while i and k are less capable of doing so because they only share few board members.

4.2.3 Network Construction and Variables Measuring Network Embeddedness

A network consists of nodes (vertices) and edges (ties), and social network analysis is the practice of analyzing the social structure through networks (graphs). In a network, the nodes can be any entities of interests, for example, organizations, individuals, events, countries, or even abstract political concepts. The edges (ties) represent the relationships (e.g., friendship or affiliation) between the nodes.

[15]The "regions" in this study includes the following administrative divisions of China: 22 provinces, 5 autonomous regions, and 4 municipalities. See http://bit.ly/2OByozb for a list of these regions.

Scholars have developed various metrics to measure the importance of nodes in terms of strategic positions (Freeman, 1977, 1978; Wasserman & Faust, 1994). Among these metrics, concepts and measures of centrality have been used extensively (Abbasi, Hossain, & Leydesdorff, 2012, p. 406). In general, there are four types of centrality describing the importance or embededness of nodes in a network (Faust, 1997, p. 160).

1. *Degree centrality* measures a given node's direct connection with other nodes, actors are central if they are directly connected with many other nodes.

2. *Betweenness centrality* measures how often a given node falls along the shortest path between two other nodes, nodes with high betweenness centrality are central because they are capable of mediating information or resource flows between other actors.

3. *Closeness centrality* measures the sum of geodesic distances from a given node to all the other nodes in the network, actors are central if they can reach many other nodes through efficient (i.e., short) paths.

4. *Eigenvector centrality* calculate the centrality for a node based on the centrality of its neighbors: actors are central if they are connected to other nodes that are themselves important. Based on different algorithms, eigenvector centrality has numerous variants, for example, the Katz centrality (Bonacich, 1987; Katz, 1953) was used in an study assessing the impact of donor's social network on crowd-out effect (Chih, 2016). Eigenvector centrality shows advantages compared to other centrality measures (Bonacich, 2007), especially in analyzing exchange networks (Borgatti & Everett, 2006; Cook, Emerson, Gillmore, & Yamagishi, 1983).

Among the four measures, degree centrality is most fundamental and we can expect it may be collinear with the other network variables. But for the other three measures, although they all measure the importance of position in a network, these metrics are different by nature because they use different assumptions and theories to define "importance." Correlation analysis supports this hypothesis: Degree centrality strongly correlates with betweenness and closeness centrality ($r > 0.7$) and moderately correlates with Katz centrality ($r > 0.5$). Therefore, we exclude degree centrality and use betweenness, closeness, and Katz centrality in regression analysis (Table 4.10).

Table 4.10: Correlation matrix of network centrality values. Degree centrality is excluded in regression models because it strongly correlates with betweenness and closeness centrality ($r > 0.7$) and moderately correlates with Katz centrality ($r > 0.5$).

	DG	*N*	*D*	*B*	*C*	*K*
Direct government funding	1.0					
Neighbor government funding	0.24	1.0				
Degree centrality	0.053	0.090	1.0			
Betweenness centrality	0.031	0.070	0.79	1.0		
Closeness centrality	0.029	0.063	0.55	0.45	1.0	
Katz centrality	0.0064	0.016	0.53	0.49	0.32	1.0

4.2.4 Control Variables at Organizational Level

Control variables at the organizational level include: variables measuring government connections (government or non-government affiliated and number of government officials on board), foundation's working area, fundraising type, and a set of variables measuring organizational capacity (age, asset size, and board size)[16]. A detailed list of these variables is in http://bit.ly/2OByozb.

Variables measuring government connections. In the studies on Chinese nonprofits and civil society, one of the most important research interests is the nonprofits' relationship with government and politics (Chamberlain, 1993; Estes, 1998; Kang & Han, 2008; J. Ma & DeDeo, 2018; Q. Ma, 2002a, 2002b; Spires, 2011; Teets, 2017; Unger & Chan, 1995, e.g.,). Chinese nonprofits are divided into two categories: non-governmental organizations (NGOs) and government-affiliated NGOs (GONGOs). NGOs are funded and operated by civic power, for example, the social elites and ordinary citizens. On the contrary, the GONGOs are initiated, funded, and well-connected with the state.

The government organizes the GONGOs for transforming part of its functions, especially the social welfare functions (detailed history was reviewed in Q. Ma, 2002a). For example, the China Youth Development Foundation (CYDF) was established by the Chinese Communist Youth League Central Committee (CCYLCC) in March 1993 (China Youth Development Foundation, 2017a). Former principals of CCYLCC include Li Keqiang, the current Premier of China, and Hu Jintao, the former General Secretary of the Communist Party Central Committee and the President of China. CYDF is committed to "helping young people build capacity and to improving the

[16]The number of full-time employees may also measure the organizational capacity, but many Chinese foundations have "zero" full-time employees because they have their employees sponsored by external companies or supervising government departments to minimize foundations' administrative expenditure; therefore, a pool indicator of organizational capacity in Chinese context.

environment for their growth by providing aid services, giving a voice to the interests of young people and by carrying out social advocacy" (China Youth Development Foundation, 2017b). The government also transforms the functions that are politically sensitive to GONGOs: social issues on human rights, policy advocacy, and social stability (J. Ma & DeDeo, 2018, p. 4). For example, the China Foundation For Human Rights Development is directed by the State Council Information Office, and its president of the board is Huang Mengfu, a vice chairman of the Chinese People's Political Consultative Conference and a national leader of China (China Foundation For Human Rights Development, 2017).

The GONGOs are more likely to receive government funding because of their close connections with the government. In this study, a foundation is identified as GONGO if it meets one of the following criteria (Ni & Zhan, 2017, p. 735; Q. Wang, 2018):

1. Founding organization is governmental or quasi-governmental;
2. Initial endowment is from a governmental agency;
3. Current or retired government officials as employees or board members; Share the same office address with supervising or sponsoring governmental or quasi-governmental organizations.

Other than the dummy variable measuring being GONGO or not, variables counting the number of government officials on board are also used as controls including "number of government officials serving as principals" and "number of retired government officials who are provincial or above."

Foundation's working area is defined as politically sensitive and politically non-sensitive. J. Ma and DeDeo (2018) show that foundations working on politically sensitive topics (i.e., engaging in advocacy, international affairs, religious or ethnic issues, and the police or the legal system, or related "social stability" issues) have more government officials on board, and people may be less likely to donate to these foundations.

Fundraising type is dummy-coded as public fundraising and non-public fundraising. The public-fundraising foundations can solicit donations publicly, e.g., advertising in shopping malls or subways; while non-public fundraising foundations are only allowed to solicit through private channels and target specified individuals. The difference in fundraising capacity may influence private donations. Meanwhile, the public-fundraising foundations are more likely to be well-connected with the government than non-public fundraising foundations. Therefore, the status of being pubic

or non-public may confound the relationship between government funding and private donation.

A set of variables measuring organizational capacity includes age, asset size, and board size. According to organizational ecology theory, new and/or small organizations are more likely to be influenced by the external environment, these phenomena are termed the "liability of newness" and "liability of smallness" respectively (Baum & Shipilov, 2006, pp. 62–63). This perspective sets the rationale for controlling age and asset size. Organizations with larger boards of trustees may be stronger in organizational capacity and have more social connections with donors. These control variables were also used in numerous previous studies (e.g., Ni, Chen, Ding, & Wu, 2016; Ni & Zhan, 2017; Nie, Liu, & Cheng, 2016; Wei, 2017).

4.2.5 Control Variables at the Regional Level

The control of social and economic characteristics of geographical regions include: individuals' actual experience of volunteering and willingness to volunteer, per capita gross regional product, population at year-end, per capita disposable income of households, and government spending on social security and employment [17]. (Andreoni & Payne, 2003, 2011; Payne, 1998, 2009).

4.3 Estimation Strategy

4.3.1 Omitted Variables and Endogeneity Bias

The omitted variables (OVs) that change both the dependent and endogenous variables will cause the endogeneity problem, resulting in biased estimations of β, γ, and δ in the basic setup (Eq. 4.1). In this study, there are three types of possible OVs that may bias the estimation:

1. *Organization-specific* OVs: These OVs, which cause variation in both government funding and private donations, measure the characteristics of the foundations.

2. *Time-specific* OVs: These OVs are related with time, for example, a natural disaster that can increase both government funding and private donations to foundations.

[17] This category includes 17 subcategories consisting of public social welfare spending, basic living stipend, and natural disaster relief, etc. See PRC Ministry of Finance (2006) for a detailed explanation.

3. *Region-specific* OVs: The OVs that measure the characteristics of a geographical region. For example, a province may have a special policy that encourages both government funding and private donations.

4.3.2 Regression Models

Since the dataset in this study consists of nonprofits' annual data, and these organizations rarely change their locations, we expect the organization fixed-effect regression model should be able to control for many of the time- and region-specific OVs. Therefore, we use two regression models to estimate the coefficients:

Pooled ordinary least square (pols) uses Eq. 4.1 to estimate the coefficients of independent variables. This estimation serves as the baseline model and does not consider the OVs and panel structure.

Organization fixed-effect regression (ofe) considers the organization-specific OVs and adds an entity fixed effect (α_i) to the baseline equation (Eq. 4.4).

$$\begin{aligned} Donations_i = \alpha_i + \beta \cdot GovFund_i + \gamma \cdot NbrGovSum_i + \delta \cdot NetEmbed_i + \\ \omega \cdot Controls_i + \mu \cdot Controls_r + \varepsilon_i \end{aligned} \tag{4.4}$$

4.4 Dataset

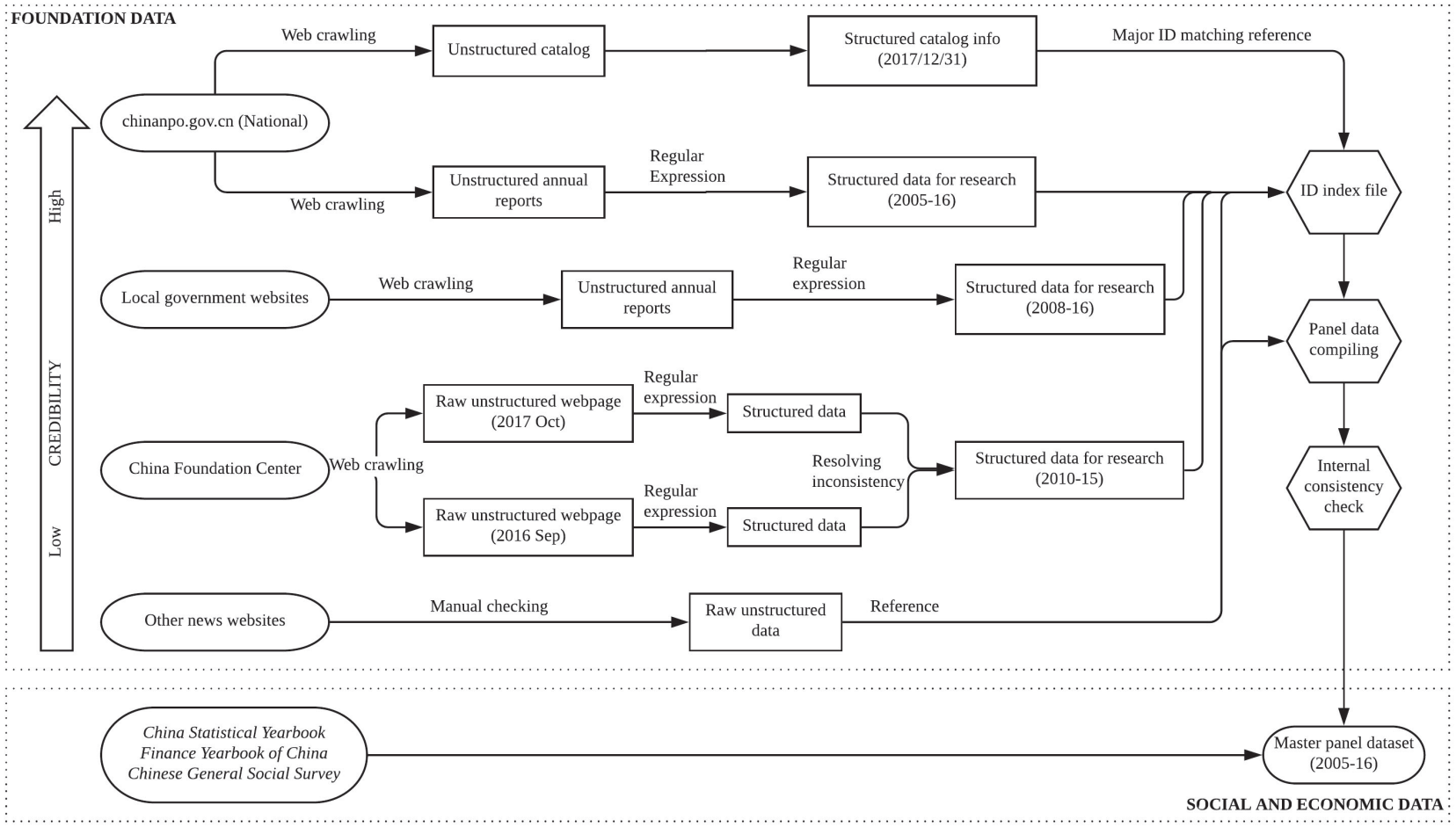
4.4.1 Dataset Compiling

Figure 4.10 illustrates the workflow of dataset compiling. The master panel dataset includes two components of data: *foundation data* (e.g., government funding, total asset, and organization age, etc.) and *social and economic statistics* (e.g., the percentage of population volunteered in the last year, per capita gross regional product, and population at year-end, etc.). The data on foundations are mainly drawn from four sources ranked by credibility:

1. China Social Organizations (CSO)[18]. This is the official website disclosing annual reports and other information of social organizations registered in mainland China (i.e., foundation *jijinhui*, membership-based association *shehui tuanti*, and social service organizations *shehui fuwu jigou*). The website is held by the Ministry of Civil Affairs of China. The annual reports released by CSO contain the most comprehensive information about foundation, including basic infor-

[18] http://www.chinanpo.gov.cn

Figure 4.10: Workflow for compiling master panel dataset.



mation, board member information, financial position, financial activities, and cashflow, etc.

2. Local government websites. CSO misses some of the foundations' annual reports, for example, it does not have the annual reports of foundations registered in Shanghai because Shanghai has its own information disclosing platform[19]. Data were crawled from these local government websites to supplement the CSO's data.

3. China Foundation Center (CFC)[20]. CFC releases limited information of foundations registered in mainland China. Data released by CFC includes basic profile (e.g., foundation name, founding date, and board member information), program information (e.g., program name and description), and financial overview (e.g., net asset, total annual income, and total government funding).

4. Other credible news websites. For example, Xinhua News Agency[21] (the official press agency of China), People's Daily[22] (an official newspaper of the Chinese Communist Party), and Baidu Encyclopedia[23] (the largest Chinese-language, collaborative, web-based encyclopedia).

When data from different sources have discrepancies, those from sources with higher credibility are used. Detailed methodologies and codebook are described in the Research Infrastructure of Chinese Foundations (J. Ma et al., 2017b); RICF).

The data on social and economic status are pulled from *China Statistical Yearbook* (CSY) (National Bureau of Statistics of China, 2017), *Finance Yearbook of China* (FYC) (China Financial Magazine, 2017), and the Chinese General Social Survey (CGSS) (Bian & Li, 2012). Link http://bit.ly/2OByozb details all the variables, roles in equations, and data sources.

4.4.2 Dataset and Variable Description

Table 4.11 describes the number of foundations by year and in comparison to those numbers recorded by *China Statistical Yearbook* (National Bureau of Statistics of

[19]http://xxgk.shstj.gov.cn
[20]http://foundationcenter.org.cn
[21]http://www.xinhuanet.com
[22]http://www.people.com.cn
[23]http://baike.baidu.com

Table 4.11: Dataset size compared to the numbers of foundations recorded by Yearbook and RICF. Yearbook = *2017 China Statistical Yearbook* (National Bureau of Statistics of China, 2017); RICF = Research Infrastructure of Chinese Foundations (J. Ma et al., 2017b). The percentage shows the dataset's size in proportion of the average number of foundations recorded by Yearbook and RICF (e.g., for 2005, $12.51\% = \frac{113}{975+832} \cdot 100\%$).

Year	Yearbook	RICF	Dataset profile	Dataset board
2005	975	832	113 (12.51%)	–
2006	1,144	982	192 (18.06%)	–
2007	1,340	1,188	194 (15.35%)	–
2008	1,597	1,416	490 (32.53%)	–
2009	1,843	1,665	695 (39.62%)	–
2010	2,200	2,040	1,923 (90.71%)	591 (27.88%)
2011	2,614	2,430	2,130 (84.46%)	2,287 (90.68%)
2012	3,029	2,880	2,508 (84.89%)	2,540 (85.97%)
2013	3,549	3,344	3,100 (89.95%)	3,156 (91.57%)
2014	4,117	4,233	3,478 (83.31%)	3,577 (85.68%)
2015	4,784	4,895	3,320 (68.60%)	3,454 (71.37%)
2016	5,559	–	1,466 (26.37%)	1,343 (24.16%)

Table 4.12: Composition of the panel dataset.

Foundation type	#of foundation	%of foundation with 3+ observations	#of observations studied	%of total observations for foundations with 3+ observations
Fundraising type				
Public	1,407	93.0%	8,212	98.1%
Non-public	2,458	78.0%	10,862	91.7%
Total	3,865	83.5%	19,074	94.5%
Working area				
Sensitive	1,202	77.1%	5,728	92.5%
Non-sensitive	2,977	76.4%	13,663	91.9%
Total	4,179	76.6%	19,391	92.1%
All foundation	4,238	76.2%	19,609	92.0%

China, 2017) and RICF. Table 4.12 describes the composition of the dataset. Although unbalanced overall, the dataset has 3,147 foundations with at least 3 observations, and these foundations generate a total of 15,519 observations, rendering a dataset with very high quality.

4.4.3 Missing Data and Approximation Strategy

The missing financial statistics and board member information are critical to our analysis. For *financial statistics*, there are missing observations and missing fields. Because the inactive foundations may not disclose their annual reports regularly, this results in *missing observations* that can hardly be imputed. For *missing fields*, some of the observations omit values of variables that can be inferred from other data about the organization. For example, the amount of total donation is the sum of donations made by individuals and those made by corporations. Therefore, the missing values of individual donation can be imputed by subtracting corporate donation from total donation (detailed procedures in http://bit.ly/2OByozb) Otherwise, we made no imputation for the missing variable and omitted the observation. Because of missing observations, the dataset may only be a representative sample of active but not all foundations. The data fields that are missing at random can reduce statistical power but our estimates are unbiased. The analysis and conclusion should consider these limitations.

The *board member information* is the only source for constructing board interlocking networks, but it was too rarely reported during the years 2005-2010 and 2016 to construct reliable networks (see Table 4.11 "Dataset board" column). Rather than omitting these years, we constructed approximate networks using board membership in the nearest reliable year. That is, using the 2011 network for 2005 to 2010 and 2015 network for 2016. The quality of this approximation depends on the rate of board turnover, which is generally low in the nonprofit sector (J. Ma & DeDeo, 2018, p. 293).

We use a Chow test (Chow, 1960) to statistically test whether data from the years using approximated network can be combined with data from other years. Because the records from 2011–2015 are more reliable, subset 2011–2015 (*core*) is used as baseline in comparisons with subsets 2005–2010 (*ss10*) and 2016 (*ss16*). For *core* and *ss10*, $F(22, 6836) = 1.31, p = 0.15$, the null hypothesis that there is no structural break between datasets can not be rejected, supporting the two datasets are poolable. But *core* and *ss16* can not be pooled together because the null hypothesis is rejected ($F(22, 5542) = 4.07, p < 0.001$). We therefore prepared the following datasets:

- *Pooled dataset (pooled)* combines data *ss10* and *core*, that is, using the 2011 board interlocking network for 2005-2010.
- *Core dataset (core)* is compiled using records from 2011-2015 and data from these years have the best quality (Table 4.11).

- *Subset 3+ (3plus)* consists of records generated from the organizations that have at least 3 observations in the *core* dataset.

There are both pros and cons for using different datasets. The *pooled* dataset is aggressive and may result in a higher risk of Type I error ("false positive" finding). While the *3plus* subset is conservative and may increase the risk of Type II error ("false negative" finding). The *core* subset is in between.

4.5 Results

4.5.1 Descriptive Analysis

Descriptive Statistics of Major Variables

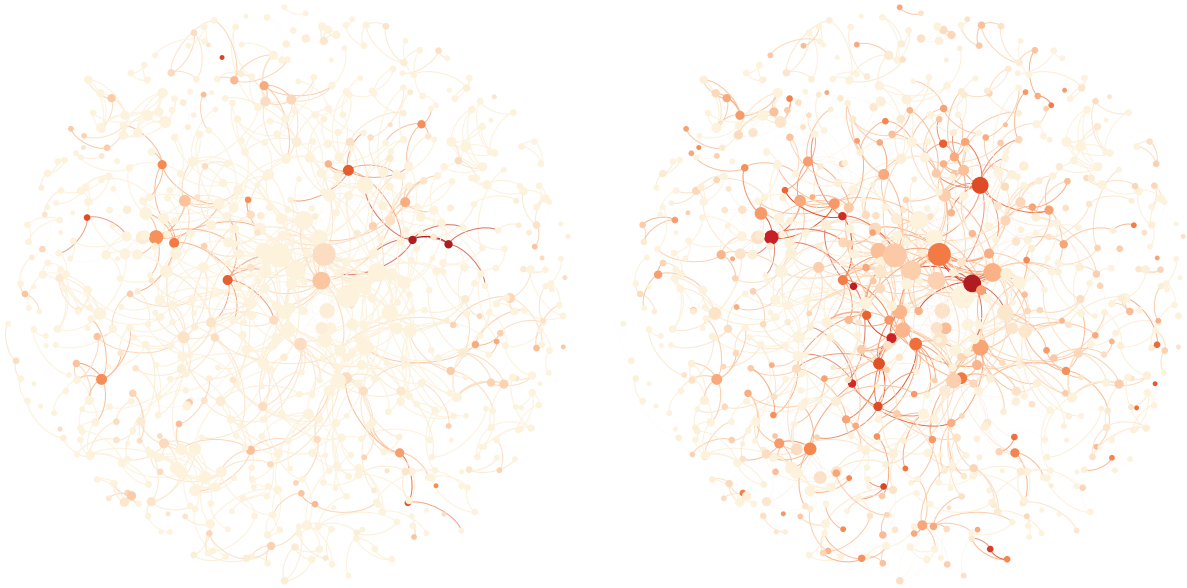
Table 4.13 reports the summary statistics of major variables. Most of these variables are highly skewed, for example, more than 75% of the foundations do not receive any funding from the government, but the largest amount of government funding ever received is nearly 1.4 billion CNY. The median value of private donations made by individuals is 2,503 CNY, but the largest value is almost 1.1 billion. The median board size is 10 people, but the largest board has 49 members. Government official's presence is widespread on board: there is 0.5 government official on each foundation's board on average, and the foundation that has the most extensive government connection has 41 officials on board.

Board Interlocking Network and Top Receivers

Figure 4.11 illustrates the board interlocking network of Chinese foundations by direct government funding and private donation in 2013[24]. In both graphs, isolated nodes and dyads are removed. Node size represents node degree (i.e., the number of connected nodes), and node color represents the z-score transformed values of direct government funding or private donation (the larger the deeper). According to the visualizations, well-connected organizations are more likely to receive larger amounts of private donation, but the relationship between connectedness and direct government funding is not obvious. The average degree of the network is 3.18, the average path length is 6.73, and the network diameter is 22. Compared to what has been found about the corporate network in the United States, the board interlocking network of Chinese foundations is much sparser (Davis et al., 2003).

[24]We choose the 2013 network because board member information of this year is the most comprehensive (Table 4.11).

Figure 4.11: The board interlocking network of Chinese foundations in 2013. In both graphs, isolated nodes and dyads are removed. Node size represents node degree (i.e., the number of connected nodes), and node color represents the z-score transformed values of government funding or private donation (the larger the deeper).



(a) Color depth represents government funding. (b) Color depth represents private donation.

Table 4.14 describes the top receivers of government funding and private donation. Between 2005–2016, 50 foundations are ranked as the top-10 government funding receivers (tgf), 46 top-10 neighbor government funding receivers ($tngf$), and 67 top-10 private donation receivers (tpd). Top receivers of tgf are funded by the government with 56 million CNY a year on average. Neighbor organizations of $tngf$ receives 310 million CNY from the government per year on average. And the tpd foundations receive 84 million CNY from private individuals on average annually.

Interesting pattern emerges for board size: different types of top receivers are very close in board size – they all have a board with about 17 members, which is higher than the overall average 12. Over 80% of all these top receivers are GONGO, and the average number of government officials on board of these foundations are substantially higher than the overall average (0.5 person per organization).

Foundations appear in all rankings are: 1) Chou Pei-yuan Foundation focusing on international relations, education, and technologies, supervised by the United Front Work Department of the Central Committee of the Communist Party of China; 2) China Education Development Foundation supervised by the Ministry of Education; 3) China Postdoctoral Science Foundation supervised by the Ministry of Human Resources and Social Security; 4) China Women's Development Foundation supervised by the All-China Women's Federation; 5) China Legal Aid Foundation supervised by the Ministry of Justice; and 6) Chinese Red Cross Foundation supervised by the Red Cross Society of China.

Table 4.13: Descriptive statistics of major variables. Monetary variables are in millions if not specified otherwise; units of other variables are in parentheses.

Variable	Obs.	Mean	Std. deviation	Min	25%	50%	75%	Max
Private donation made by domestic individual	19609	1.9	13	0	0	0.0025	0.46	1100
Direct government funding	19609	0.99	21	0	0	0	0	1400
Neighbor government funding	19609	3.8	45	0	0	0	0	1400
Degree centrality	19609	0.000 43	0.000 82	0	0	0	0.000 44	0.0096
Betweenness centrality	19609	0.000 27	0.0012	0	0	0	0	0.026
Closeness centrality	19609	0.014	0.024	0	0	0	0.027	0.095
Katz centrality	19609	0.0085	0.017	−0.32	0.0043	0.0069	0.0095	0.32
Government spending on social security and employment	18799	38 000	15 000	700	27 000	37,8.9	47 000	91 000
Per capita gross regional product (10 thousand)	19074	4.4	1.7	0.70	2.9	4.3	5.5	8.2
Per capita disposable income of households (10 thousand)	19074	1.9	0.67	0.71	1.4	1.8	2.3	3.8
Population at year-end (10 million)	19074	5.5	3.0	0.28	2.5	5.5	7.9	11
% of population aged under 15	19074	0.14	0.036	0.076	0.12	0.14	0.17	0.27
% of population aged 65 and over	19074	0.098	0.018	0.048	0.085	0.10	0.11	0.14

Continued on next page

Table 4.13 – *Continued from previous page*

Variable	Obs.	Mean	Std. deviation	Min	25%	50%	75%	Max
Percentage of people making charitable donations	19002	0.34	0.15	0.087	0.23	0.32	0.48	0.72
Percentage of people volunteering	19002	0.085	0.047	0	0.052	0.069	0.13	0.18
Organization age (year)	19074	11	7.6	3	6	9	13	36
Asset size	19600	27	130	0	2.2	5.2	15	4800
Board size (#people)	19609	12	6.6	1	7	10	17	49
Number of government officials serving as principals	16959	0.48	1.6	0	0	0	0	41
Number of retired government officials who are provincial or above	16956	0.14	0.65	0	0	0	0	36
Expenditure for charitable purposes	19577	9.8	140	0	0.19	0.80	3.3	12 000
Neighbor expenditure for charitable purposes	19609	36	380	0	0	0	3.5	13 000

Table 4.14: Profile of top receivers between 2005–2016. *tgf* = top 10 government funding receivers; *tngf*= top 10 neighbor government funding receivers; *tpd* = top 10 private donation receivers; NGO = non-governmental organizations. Numbers are mean values and standard deviations are in parentheses. Monetary variables are in million CNY. Using standard competition ranking ("1224" ranking) and two digits for numeric precision.

	tgf	*tngf*	*tpd*
N	50	46	67
Degree	3.6 (3.3)	5.4 (4.7)	3.1 (3.9)
Direct government funding	56 (110)	25 (120)	1.5 (9.1)
Neighbor government funding	24 (95)	310 (320)	14 (67)
Private donation	4.8 (15)	6.8 (13)	84 (100)
Board size (#people)	18 (6.8)	17 (7.6)	16 (7.0)
#Government official on board	2.8 (3.9)	2.9 (7.7)	1.3 (3.9)
%Government-affiliated NGO	92%	80%	82%
%Public-fundraising	76%	48%	54%
%Politically sensitive	34%	28%	36%

4.5.2 Regression Analysis

Table 4.15 shows the regression results of pooled ordinary least square and organization fixed-effect on all three datasets. Because of huge variations, the continuous variables of regional and organizational control are transformed using the natural logarithm of one plus original value, while the independent variables (i.e., direct government funding, neighbor government funding, and three centrality measures) and dependent variables (i.e., private donations made by individuals) are in raw values. This allows us to control for the impact of extreme values and know the marginal effect of a one CNY increase in government funding on private donations.

The results of *pols* and *ofe* regressions on different datasets reveals several patterns in common. First, all the *pols* regressions show the coefficients of direct government funding are statistically significant negative. de Wit and Bekkers (2017, p. 309) find that studies using archival or survey data report a mean increase of $0.06 with a 95% confidence interval between -0.04 and 0.15. Our finding also lies in this range.

The results of neighbor government funding are surprising: all the regressions show that the coefficients of neighbor government funding are consistently positive, and all the fixed effect regressions suggest the coefficients are around 0.4 and statistically significant. In other words, a one CNY increase of government funding to i's neighbor organizations is associated with a 0.4 CNY increase in private donations to i.

Taken together, the results suggest that, although direct government funding to organization i may crowd out private donation to i, the government funding to i's neighbor organizations can crowd in the private donations to i by a magnitude which is about three times larger than the crowd-out effect of direct government funding ($p < 0.05$). The overall effect of government funding to nonprofit organizations is an increased provision of private donation.

Considering network position, Katz centrality, a variant of eigenvector centrality, has a negative impact on private donations suggested by all the regressions and is statistically significant in all *ofe* models. That is to say, by keeping all the other predictors and controls constant, nodes with higher Katz centrality receive less private donations. Nodes with higher Katz centrality values may not be important by themselves, but they are connected to more influential nodes in a network (Borgatti, 2005, pp. 61–62). Therefore, a possible explanation is that the influential nodes attract more flows of private donations, leaving less attention to the nodes tied to them. In general, all these findings support our hypothesis that private donations can be redirected by social relations.

Table 4.15: Results of regression models on different datasets. *Dependent variable* = Private donations made by individuals; *pols* = pooled ordinary least square; *ofe* = organization fixed-effect; *pooled* = pooled dataset; *core* = core dataset; *3plus* = organizations with more than 3 observations in *core* dataset. For *ofe*, within group R^2 are reported. Heteroskedasticity-consistent standard errors (White, 1980) are in parentheses. Continuous variables of regional and organizational control are transformed using the natural logarithm of one plus original value. Independent variables (i.e., direct government funding, neighbor government funding, and three centrality measures) and dependent variables are in raw values. Using two digits for precision. $*p < 0.1$; $\dagger p < 0.05$; $\ddagger p < 0.01$.

	pols-pooled	*pols-core*	*pols-3plus*	*ofe-pooled*	*ofe-core*	*ofe-3plus*
Direct government funding	−0.0085†	−0.012‡	−0.013‡	−0.025	−0.012	−0.012
	(0.0037)	(0.0035)	(0.0036)	(0.020)	(0.013)	(0.013)
Neighbor government funding	0.16	0.21	0.20	0.42∗	0.36†	0.36†
	(0.13)	(0.15)	(0.14)	(0.22)	(0.15)	(0.15)
Betweenness centrality	−1.7	−0.087	0.053	1.7	1.6	1.9
	(1.7)	(2.2)	(2.3)	(1.9)	(2.3)	(2.4)
Closeness centrality	0.31‡	0.28‡	0.28‡	−0.030	−0.11	−0.11
	(0.091)	(0.095)	(0.095)	(0.19)	(0.29)	(0.28)
Katz centrality	−0.015	−0.071	−0.10	−0.24∗	−0.22	−0.26∗
	(0.21)	(0.24)	(0.26)	(0.13)	(0.14)	(0.15)
Organizational controls	yes	yes	yes	partly omitted	partly omitted	partly omitted
Regional controls	yes	yes	yes	partly omitted	partly omitted	partly omitted
N	6880	5170	4923	6880	5170	4923
Adjusted/Within group R^2	0.027	0.026	0.030	0.0048	0.0044	0.0050

Table 4.16: Correlation matrix of coefficients of *ofe* model for *pooled* dataset.

	D	N	B	C	K
Direct government funding	1.0				
Neighbor government funding	−0.25	1.0			
Betweenness centrality	−0.16	−0.0014	1.0		
Closeness centrality	0.057	−0.097	−0.54	1.0	
Katz centrality	0.017	−0.0024	−0.70	0.070	1.0

4.5.3 Robustness Analysis

Robustness of the estimations is analyzed from two perspectives: statistical and theoretical. Statistical robustness tests include post-estimation analysis and sensitivities to other omitted variables. Theoretical tests check the robustness of our theoretical assumptions.

Statistical Robustness

Post-estimation analysis. The correlation matrix of coefficients of *ofe* models do not suggest strong correlations between the coefficients (except for betweenness centrality). Table 4.16 shows the *ofe* model for *pooled* dataset.

Leadership change. Variants in organizational capacity may be time, region, and organization independent, for example, the personnel changes in fundraising or leadership positions. Previous studies used leadership change as an indicator of variation in organizational capacity since data of staff mobility at the administrative and executive level can hardly be obtained (Hansmann & Thomsen, 2017; Ribar & Wilhelm, 2002). This study operationalizes foundation's leadership change as the turnover of either executive principal or board chair [25]. Statistical tests show that the coefficient of leadership change is not significant, and leadership change has minimal impact on all the other coefficients (Table A.9 in http://bit.ly/2OByozb).

Theoretical Robustness

Interaction between network effect and revenue flows. Our theoretical assumption does not consider the interactions between network measures and funding variables which may skew the estimations. We can examine the impact of interaction by building the estimations incrementally, that is, starting without network measures and entering the centrality values singly. As tables in http://bit.ly/2OByozb shows,

[25] Dummy variable with 0 indicating the same with previous year and 1 otherwise.

the addition of centrality values has little impact on the coefficients of direct and neighbor government funding.

Neighbor foundations' expenditure. Our estimation strategy takes an "input-based theory," that is, all the variables measure the resources that flows into foundations (e.g., government funding and private donations to foundations). Using an "output-based theory," neighbor foundations' outputs (e.g., charitable expenditure) may also influence the crowd-out effect (Ribar & Wilhelm, 2002, p. 428). For example, along with the increase of charitable expenditures from neighbor nonprofit a and b, recipients' demands may be decreased, resulting in the decrease of private donations to ego nonprofit i.

We use weighted neighbor foundations' total expenditures for charitable purposes (similar to Eq. 4.2) as one of the output-based OVs. Results show that it has little impact on all the *ofe* models (Table A.9 in http://bit.ly/2OByozb), and we cannot reject the null hypothesis that the coefficient of this variable is equal to zero by Wald test ($p > 0.25$).

Operationalization of neighbor government funding. The raw values of neighbor government funding are weighted by Eq. 4.3 since our theoretical assumption assumes that the "isomorphicness" between boards in terms of similarity of board composition matters. We can substitute the weighted values for raw values to examine this assumption. As Table 4.17 shows, the substitution has minimal impact on all the other independent variables. The coefficients of raw neighbor government funding, although significant, are much smaller than those in Table 4.15, suggesting the effectiveness and validity of weighting using "isomorphicness."

Table 4.17: Regression models using raw values of neighbor government funding. *Dependent variable* = Private donations made by individuals; *pols* = pooled ordinary least square; *ofe* = organization fixed-effect; *pooled* = pooled dataset; *core* = core dataset; *3plus* = organizations with more than 3 observations in *core* dataset. For *ofe*, within group R^2 are reported. Heteroskedasticity-consistent standard errors (White, 1980) are in parentheses. Continuous variables of regional and organizational control are transformed using the natural logarithm of one plus original value. Independent variables (i.e., direct government funding, neighbor government funding, and three centrality measures) and dependent variables are in raw values. Using two digits for precision. $*p < 0.1$; $\dagger p < 0.05$; $\ddagger p < 0.01$.

	pols-pooled	*pols-core*	*pols-3plus*	*ofe-pooled*	*ofe-core*	*ofe-3plus*
Direct government funding	−0.0081†	−0.012‡	−0.012‡	−0.025	−0.011	−0.011
	(0.0041)	(0.0042)	(0.0042)	(0.019)	(0.012)	(0.012)
Raw neighbor government funding	0.0070	0.0088∗	0.0086∗	0.011∗	0.0089†	0.0088†
	(0.0044)	(0.0051)	(0.0051)	(0.0059)	(0.0042)	(0.0042)
Betweenness centrality	−1.1	0.41	0.61	0.73	0.96	1.3
	(1.6)	(2.1)	(2.2)	(1.7)	(1.9)	(2.0)
Closeness centrality	0.22‡	0.24‡	0.23‡	0.061	−0.022	−0.020
	(0.074)	(0.084)	(0.084)	(0.14)	(0.15)	(0.15)
Katz centrality	−0.014	−0.073	−0.097	−0.26†	−0.25∗	−0.28∗
	(0.21)	(0.23)	(0.26)	(0.13)	(0.13)	(0.15)
Organizational controls	yes	yes	yes	partly omitted	partly omitted	partly omitted
Regional controls	yes	yes	yes	partly omitted	partly omitted	partly omitted
N	14931	12020	11016	14931	12020	11016
Adjusted/Within group R^2	0.029	0.026	0.029	0.0047	0.0033	0.0039

4.6 Conclusion

By using a novel panel dataset across 12 years, this study makes three contributions to the literature: 1) extending the theory for understanding crowding mechanism by considering social relations, 2) broadening the scope of research on this topic to one of the largest countries that has never been examined before, People's Republic of China, 3) proposing and testing two modes of crowding mechanism of government funding using network theory – the compensating mode and amplifying mode. If the government funding has a direct-crowd-out (in) effect on nonprofit i and cross-crowd-out (in) effect on the isomorphic nonprofits a and b that are linked to them through social relations, the crowding effect is amplified and therefore named as "amplifying mode." By a similar rationale, if the direct- and cross-crowding effects are in different directions, the mechanism is labeled as "compensating mode."

We find the evidence supporting the compensating mode. Although direct government funding to organization i appears to crowd out private donation to i, the government funding to i's neighbor organizations appears to crowd in the private donation to i by a larger magnitude, therefore, potentially increase the overall provision of private donation. The compensating mode provides an important alternative explanation to crowd-out effect of government funding on private donations: the private donations may not be reduced, but redistributed or even reinforced in the networked society.

The crowd-in effect of neighbor government funding is surprisingly large compared to what has been reported. Studies neglecting cross-crowd-out/in and using archival or survey data report a mean increase of \$0.06 with a 95% confidence interval between -0.04 and 0.15 (de Wit & Bekkers, 2017, p. 309). The number found in this study (i.e., 0.4), although not directly comparable, is way beyond the 95% confidence interval. This large coefficient may be the result of high trust in government and ripple effect. Many studies have reported that the Chinese have strong confidence in government decision (Lianjiang Li, 2004; Shi, 2001; Z. Wang, 2005; Zhong, 2014), and the government funding is a positive signal of endorsement. Such endorsement is especially important in China where political sensitiveness is vital for nonprofit's survival. When government gives funding to nonprofit i, it is not only endorsing nonprofit i but also the service field that i operates in. Such signal can increase donors' confidence in supporting isomorphic nonprofits – although individuals may not donate to the nonprofits that have been well supported by the government, they can be

more confident in supporting similar organizations, and finally a positive ripple effect of government funding can be generated from this process.

The network position also matters: if the organization is connected with more influential nodes, it receives less private donations because the donation flows may be attracted by influential neighbor foundations. For nascent organizations, although sharing board members and personnel with influential forerunners is a possible approach of accessing more resources, it can also put the nascent organizations in disadvantaged positions because the influential foundations may attract more donation flows, leaving their neighbor organizations less attention. Taken together with the compensating mode, this evidence supports the hypothesis that the resources can be redistributed through social relations.

Our findings have several policy and practical implications. First, it is important to establish connections between organizations because the private donations to nonprofits can be redistributed through social relations. Therefore, even though government funding to an organization can crowd out private donations to the same organization, this crowd-out effect is more than compensated for by gifts to neighboring organizations. Second, government should support nonprofits that are well-connected because these organizations have more neighbor organizations to which the private donations can be redirected. Therefore, a stronger ripple effect of government funding can be generated. Third, for organizations that are interested in having more private donations, they can establish connections with foundations which receive large government support, but should be very careful in making friends with influential players which are more capable of attracting resource flows, overshadowing their peers. In general, government should support nonprofit sector with confidence because the increase of government funding will not be undermined by crowd-out effect if we consider the complex funding system as a whole.

Chapter 5 Concluding remarks: Towards a holistic network theory of government–nonprofit relationship

This dissertation achieve two goals: 1) Introducing data science methodologies to nonprofit studies; 2) Examining the impact of social relations on nonprofits' social and economic behaviors. Ultimately, this dissertation provides empirical evidence for a new paradigm which is just in formation by a few scholars: a holistic network theory of government–nonprofit relationship.

5.1 Dissertation Conclusions

Data scarcity is one of the major barriers in Chinese nonprofit studies. In responding to this issues, Chapter 2 establishes a robust and general-purpose database which has the potential to support the development of a research topic. It also introduces the methodology for data management in contemporary quantitative social science. The normalized database schema consists of three major themes: basic organizational profile of foundations (i.e., *basic profile*, *board member*, *supervisor*, *staff*, and *related party* tables), program information (i.e., *program information*, *major program*, *program relationship*, and *major recipient* tables), and financial information (i.e., *financial position*, *financial activities*, *cash flow*, *activity overview*, and *large donation* tables). The data quality can be measured by four criteria: data source reputation and credibility, completeness, accuracy, and timeliness. Data records are properly versioned, allowing verification and replication for research purposes.

Based on the database, Chapter 3 approaches the research question of NGO's autonomy using network theory and finds the Chinese foundations are board-interlocked – a practice of sharing board members between different organizations. This board interlock leads to the emergence of an elite group with privileged network positions. While the presence of government officials on nonprofit boards is widespread, government officials are much less common in a subgroup of foundations that control just over half of all revenue in the network. This subgroup, associated with business elites, not only enjoys higher levels of within-elite links, but preferentially excludes government officials from the NGOs with higher degree. The emergence of this structurally autonomous sphere is associated with major political and social events in the state-society relationship. Cluster analysis reveals multiple internal components within this sphere that share similar levels of network influence. Rather than a core-periphery structure centered around government officials, the Chinese nonprofit world appears to be a multi-polar one of distinct elite groups, many of which achieve high levels

of independence from direct government control. The Chinese nonprofit sector also suggests the existence of autonomous order which has been theorized by political philosophers and observed in liberal societies.

Chapter 4 reconsiders a classic research question in public economics – the crowd-out/in effect of government funding on private donations to nonprofits. This chapter proposes an innovative theoretical perspective for understanding the role of social relations in crowding mechanism: compensating mode and amplifying mode. Analysis suggests that, although government funding to a nonprofit may crowd out the private donations to the same organization, private donations are not reduced but redistributed to other nonprofits in the organizational network. Our findings support the compensating mode and the importance of social relations in resource distribution. This chapter demonstrates how data science methodologies can help statistical inference in classic econometrics: it uses standardized data workflow to boost the research life-cycle and uses information extraction techniques to construct structured dataset from semi-structured raw data files. By taking the advantage of data science, this study compiled a novel panel dataset across 12 years.

In general, this dissertation not only provide examples of applying data science methodologies to nonprofit studies, but also provide empirical evidence for building the theory of nonprofit–government relationship by using network theory – a promising method of analysis and theoretical perspective for constructing a holistic theory of nonprofit–government relationship.

5.2 Future Projects

Based on this dissertation, I plan to continue my research on the theory of nonprofit–government relationship from two approaches: Building data infrastructure and developing theory through empirical studies.

5.2.1 Building Data Infrastructure

Large-scale social survey. Factual data from annual reports are abundant but not enough. The next step is to diversify the data type, that is, generate survey data from large-scale social survey. Several key points of the survey:

1. Focusing on foundations because they are and will be the dominant power in Chinese nonprofit sector for quite a long time.

2. Using the scholarly networks to generate high quality survey data. As Bian and Li (2012, pp. 81–82) concluded, there are three strategies for implementing a large-scale social survey in China: using scholarly networks, collaborating with government organizations, and contracting out to a survey firm. According to their experience, the scholarly networks can generate the data with highest quality. Building the scholarly network of Chinese nonprofit studies is an ongoing effort through the Association for Research on Nonprofit Organizations and Voluntary Action.

Linking data from different sources and countries. As more and more data projects emerge, another trend of these projects is to link data from different sources, that is, identifying the same variables in different datasets. Linking data will be very helpful for cross-national and cross-topic studies.

5.2.2 Developing Theory

This dissertation is only the first step towards a holistic theory of nonprofit–government relationship. It adds some interesting observations to existing literature, but still there is a long way to go to develop a *positive* holistic theory explaining the nonprofit–government relationship. Two aspects for future studies:

Using people instead of organization as unit of analysis. The two empirical studies in this dissertation are only able to utilize the information at organizational level. As a result, they ignore many information at individual level, for example, board member's profession (e.g., business, academia, or government official). The power structure of Chinese nonprofit sector can be pictured better using data at individual level, and the studies of power structure in authoritarian countries are essential for understanding the world political order in the age of transition.

*Historical and cultural perspective.*What are the relationships between nonprofit sector (variously defined) and government over the 5,000 years of Chinese history? This question matters because it can help us understand a foundational question in nonprofit studies: why does nonprofit sector exist? Most of the literature on nonprofit–government relationship are based on the contemporary observations in Western countries (J. Ma & Konrath, 2018; Shier & Handy, 2014), there needs to be diverse, historical, and cultural explanations on this topic to truly put forward our understanding and quest of a "global civil society."

References

Abbasi, A., Hossain, L., & Leydesdorff, L. (2012). Betweenness centrality as a driver of preferential attachment in the evolution of research collaboration networks. *Journal of Informetrics*, *6*(3), 403–412. 00166 c95. doi:10.1016/j.joi.2012.01.002

Abrams, B. A., & Schmitz, M. D. (1978). The 'crowding-out' effect of governmental transfers on private charitable contributions. *Public Choice*, *33*(1), 29–39. 00317. doi:10.1007/BF00123940

Alstott, J., Bullmore, E., & Plenz, D. (2014). Powerlaw: A Python package for analysis of heavy-tailed distributions. *PLoS ONE*, *9*(1), e85777. doi:10.1371/journal.pone.0085777. arXiv: 1305.0215

Andreoni, J. (1989). Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence. *Journal of Political Economy*, *97*(6), 1447–1458. 02776.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal*, *100*(401), 464–477. 03899. doi:10.2307/2234133

Andreoni, J., & Payne, A. A. (2003). Do government grants to private charities crowd out giving or fund-raising? *The American Economic Review*, *93*(3), 792–812. 00445.

Andreoni, J., & Payne, A. A. (2011). Is crowding out due entirely to fundraising? Evidence from a panel of charities. *Journal of Public Economics*, *95*(5-6), 334–343. 00215. doi:10.1016/j.jpubeco.2010.11.011

Atzeni, P., & De Antonellis, V. (1993). *Relational Database Theory*. 00080. Redwood City, CA, USA: Benjamin-Cummings Publishing Co., Inc.

Baker, M. (2016). 1,500 scientists lift the lid on reproducibility. *Nature News*, *533*(7604), 452. 00372. doi:10.1038/533452a

Ballou, D., Wang, R., Pazer, H., & Tayi, G. K. (1998). Modeling Information Manufacturing Systems to Determine Information Product Quality. *Management Science*, *44*(4), 462–484. doi:10.1287/mnsc.44.4.462

Barnes, J. A. (1954). Class and Committees in a Norwegian Island Parish. *Human Relations*, *7*(1), 39–58. 02950. doi:10.1177/001872675400700102

Barnes, R. C. (2017). Structural Redundancy and Multiplicity within Networks of US Corporate Directors. *Critical Sociology*, *43*(1), 37–57. 00007. doi:10.1177/0896920515580177

Barry, N. (1982). The Tradition of Spontaneous Order. *Literature of Liberty*, *5*(2), 7–58. 00223.

Baum, J. A., & Shipilov, A. V. (2006). Ecological Approaches to Organizations. In S. R. Clegg, C. Hardy, T. Lawrence, & W. R. Nord (Eds.), *The SAGE Handbook of Organization Studies*. 00000. SAGE Publications.

Bennett, J. C. (2007). *The Anglosphere Challenge: Why the English-speaking Nations Will Lead the Way in the Twenty-first Century*. 00000. Rowman & Littlefield.

Berry, J. M., & Arons, D. F. (2003). *A Voice for Nonprofits*. 00320. Washington, D.C: Brookings Institution.

Bian, Y., & Li, L. [Lulu]. (2012). The Chinese General Social Survey (2003-8). *Chinese Sociological Review*, *45*(1), 70–97. 00099. doi:10.2753/CSA2162-0555450104

Blondel, V. D., Guillaume, J.-L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *J. Stat. Mech. 2008*(10), P10008. 05787 c3287. doi:10.1088/1742-5468/2008/10/P10008

Bonacich, P. (1987). Power and Centrality: A Family of Measures. *American Journal of Sociology*, *92*(5), 1170–1182. 03110.

Bonacich, P. (2007). Some unique properties of eigenvector centrality. *Social Networks*, *29*(4), 555–564. 00596. doi:10.1016/j.socnet.2007.04.002

Borgatti, S. P. (2005). Centrality and network flow. *Social Networks*, *27*(1), 55–71. 02077. doi:10.1016/j.socnet.2004.11.008

Borgatti, S. P., & Everett, M. G. (2006). A Graph-theoretic perspective on centrality. *Social Networks*, *28*(4), 466–484. 00975. doi:10.1016/j.socnet.2005.11.005

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing Social Networks* (1 edition). 00965. Los Angeles i.e. Thousand Oaks, Calif.; London: SAGE Publications Ltd.

Borgatti, S. P., & Halgin, D. S. (2011). On Network Theory. *Organization Science*, *22*(5), 1168–1181. 00875. doi:10.1287/orsc.1100.0641

Borgatti, S. P., & Lopez-Kidwell, V. (2011). Network Theory. In *The SAGE Handbook of Social Network Analysis* (pp. 40–54). 00100. 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd.

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network Analysis in the Social Sciences. *Science*, *323*(5916), 892–895. 02181 c1144. doi:10.1126/science.1165821

Brush, E. R., Krakauer, D. C., & Flack, J. C. (2013). A Family of Algorithms for Computing Consensus about Node State from Network Data. *PLOS Computational Biology*, *9*(7), e1003109. 00020. doi:10.1371/journal.pcbi.1003109

Carroll, W. K. (2010). *The Making of a Transnational Capitalist Class: Corporate Power in the 21st Century* (1 edition). 00000. London ; New York: Zed Books.

Central Intelligence Agency. (2018). The World Factbook. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2172rank.html. 00004.

Chamberlain, H. B. (1993). On the Search for Civil Society in China. *Modern China*, *19*(2), 199–215. 00181.

Chih, Y.-Y. (2016). Social network structure and government provision crowding-out on voluntary contributions. *Journal of Behavioral and Experimental Economics*, *63*(Supplement C), 83–90. 00000. doi:10.1016/j.socec.2016.05.008

China Financial Magazine. (2017). *Finance Yearbook of China*. 00000. China State Finance Magazine.

China Foundation Center. (2016). *The CFC Independent Research Report*. 00000.

China Foundation For Human Rights Development. (2017). Introduction: China Foundation For Human Rights Development. http://rqjjh.china.cn/node_543938.htm. 00000.

China Youth Development Foundation. (2017a). Our History - CYDF. http://en.cydf.org.cn/OurHistory/. 00000.

China Youth Development Foundation. (2017b). Our Mission - CYDF. http://en.cydf.org.cn/OurMission/. 00000.

Chow, G. C. (1960). Tests of Equality Between Sets of Coefficients in Two Linear Regressions. *Econometrica*, *28*(3), 591–605. 06963. doi:10.2307/1910133

Chwe, M. S.-Y. (1999). Structure and Strategy in Collective Action. *American Journal of Sociology*, *105*(1), 128–156. 00410. doi:10.1086/210269

Clauset, A., Shalizi, C., & Newman, M. (2009). Power-Law Distributions in Empirical Data. *SIAM Rev. 51*(4), 661–703. doi:10.1137/070710111

Codd, E. F. (1970). A Relational Model of Data for Large Shared Data Banks. *Commun. ACM*, *13*(6), 377–387. 10926. doi:10.1145/362384.362685

Cook, K. S., Emerson, R. M., Gillmore, M. R., & Yamagishi, T. (1983). The Distribution of Power in Exchange Networks: Theory and Experimental Results. *American Journal of Sociology*, *89*(2), 275–305. 01036.

Cornforth, C., & Simpson, C. (2002). Change and Continuity in the Governance of Nonprofit Organizations in the United Kingdom: The Impact of Organizational Size. *Nonprofit Management and Leadership*, *12*(4), 451–470. 00049. doi:10.1002/nml.12408

Corry, O. (2010). Defining and Theorizing the Third Sector. In R. Taylor (Ed.), *Third Sector Research* (pp. 11–20). 00002. New York, NY: Springer New York.

Dai, M. (2008). Policing in the People's Republic of China: A review of recent literature. *Crime Law Soc Change*, *50*(3), 211–227. 00041. doi:10.1007/s10611-008-9131-7

Davis, G. F. (1996). The significance of board interlocks for corporate governance. *Corporate Governance: An International Review*, *4*(3), 154–159. 00157.

Davis, G. F., & Greve, H. R. (1997). Corporate Elite Networks and Governance Changes in the 1980s. *American Journal of Sociology*, *103*(1), 1–37. 01112. doi:10.1086/231170

Davis, G. F., Yoo, M., & Baker, W. E. (2003). The Small World of the American Corporate Elite, 1982-2001. *Strategic Organization*, *1*(3), 301–326. 00000 c569. doi:10.1177/14761270030013002

de Wit, A., & Bekkers, R. (2017). Government Support and Charitable Donations: A Meta-Analysis of the Crowding-out Hypothesis. *J Public Adm Res Theory*, *27*(2), 301–319. 00008. doi:10.1093/jopart/muw044

de Andrés-Alonso, P., Azofra-Palenzuela, V., & Romero-Merino, M. E. (2009). Determinants of Nonprofit Board Size and Composition The Case of Spanish Foundations. *Nonprofit and Voluntary Sector Quarterly*, *38*(5), 784–809. 00061 c31. doi:10.1177/0899764008320501

de Graaff, N. (2012). Oil elite networks in a transforming global oil market. *International Journal of Comparative Sociology*, *53*(4), 275–297. 00015. doi:10.1177/0020715212460042

de Tocqueville, A. (2012). *Democracy in America*. 00000. Liberty Fund.

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147–160. 00089. doi:10.2307/2095101

Domhoff, G. W. (2009). *Who Rules America? Challenges to Corporate and Class Dominance* (6 edition). 00005. Boston: McGraw-Hill Humanities/Social Sciences/Languages.

Dong, C., Sampaio, S. d. F. M., & Sampaio, P. R. F. (2006). Expressing and Processing Timeliness Quality Aware Queries: The DQ2L Approach. In J. F. Roddick, V. R. Benjamins, S. S.-s. Cherfi, R. Chiang, C. Claramunt, R. A. Elmasri, ... C. Vangenot (Eds.), *Advances in Conceptual Modeling - Theory and Practice* (4231, pp. 382–391). Lecture Notes in Computer Science. doi:10.1007/11908883_45

Dreiling, M., & Darves, D. (2011). Corporate Unity in American Trade Policy: A Network Analysis of Corporate-Dyad Political Action. *American Journal of Sociology*, *116*(5), 1514–63. 00068. doi:10.1086/657524

Esparza, N., & Jeon, S. H. (2013). Interlocking Boards of Trustees and Grant Acquisition Among Homeless Service Organizations. *Public Performance & Management Review*, *36*(4), 637–664. 00000. doi:10.2753/PMR1530-9576360407

Estes, R. J. (1998). Emerging Chinese foundations: The role of private philanthropy in the new China. *Regional Development Studies*, *4*. 00000 c10.

Faulk, L., Willems, J., McGinnis Johnson, J., & Stewart, A. J. (2015). Network Connections and Competitively Awarded Funding: The Impacts of Board Network Structures and Status Interlocks on Nonprofit Organizations' Foundation Grant Acquisition. *Public Management Review*, 1–31. 00005. doi:10.1080/14719037.2015.1112421

Faust, K. (1997). Centrality in affiliation networks. *Social Networks*, *19*(2), 157–191. 00423. doi:10.1016/S0378-8733(96)00300-0

Fennema, M., & Schijf, H. (1978). Analysing interlocking directorates: Theory and methods. *Social Networks*, *1*(4), 297–332. 00149. doi:10.1016/0378-8733(78)90002-3

Fennema, M., & Tillie, J. (2001). Civic community, political participation and political trust of ethnic groups. In *Multikulturelle Demokratien im Vergleich* (pp. 198–217). 00327. Springer.

Foley, M. W., & Edwards, B. (1996). The Paradox of Civil Society. *Journal of Democracy*, *7*(3), 38–52. 01138. doi:10.1353/jod.1996.0048

Freeman, L. C. (1977). A Set of Measures of Centrality Based on Betweenness. *Sociometry*, *40*(1), 35–41. 05062. doi:10.2307/3033543

Freeman, L. C. (1978). Centrality in social networks conceptual clarification. *Social Networks*, *1*(3), 215–239. 10312. doi:10.1016/0378-8733(78)90021-7

Galaskiewicz, J., Bielefeld, W., & Dowell, M. (2006). Networks and Organizational Growth: A Study of Community Based Nonprofits. *Administrative Science Quarterly*, *51*(3), 337–380. 00199. doi:10.2189/asqu.51.3.337

Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, *1*, 201. 06696. doi:10.2307/202051

Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, *91*(3), 481–510. 35645.

Hall, P. D. (2006). A Historical Overview of Philanthropy, Voluntary Associations, and Nonprofit Organizations in the United States, 1600–2000. In W. W. Powell

& R. Steinberg (Eds.), *The nonprofit sector: A research handbook* (pp. 32–65). 00000. Yale University Press.

Han, J., Ma, J., & Wang, Z. (2018). Social Value Chains: A New Organizational Framework for Studies on State-Society Relations in China. *Chinese Public Administration Review*, *9*(1), 55–74. 00000. doi:10.22140/cpar.v9i1.152

Hansmann, H., & Thomsen, S. (2017). *The Governance of Foundation-Owned Firms* (SSRN Scholarly Paper No. ID 3112766). Social Science Research Network. 00000. Rochester, NY.

Heaberlin, B., & DeDeo, S. (2016). The Evolution of Wikipedia's Norm Network. *Future Internet*, *8*(2), 14. 00017. doi:10.3390/fi8020014

Heemskerk, E. M., & Takes, F. W. (2016). The Corporate Elite Community Structure of Global Capitalism. *New Political Economy*, *21*(1), 90–118. 00030. doi:10.1080/13563467.2015.1041483

Hsu, C. L. (2010). Beyond Civil Society: An Organizational Perspective on State–NGO Relations in the People's Republic of China. *Journal of Civil Society*, *6*(3), 259–277. 00000. doi:10.1080/17448689.2010.528949

Hsu, J. Y. J., Hsu, C. L., & Hasmath, R. (2017). NGO Strategies in an Authoritarian Context, and Their Implications for Citizenship: The Case of the People's Republic of China. *Voluntas*, *28*(3), 1157–1179. 00020. doi:10.1007/s11266-016-9806-0

Jiao, A. Y. (2001). Police and Culture: A Comparison between China and the United States. *Police Quarterly*, *4*(2), 156–185. 00059. doi:10.1177/109861101129197789

Jilke, S., Lu, J., Xu, C., & Shinohara, S. (2018). Using Large Scale Social Media Experiments in Public Administration: Assessing Charitable Consequences of Government Funding of Nonprofits. *Journal of Public Administration Research and Theory*. 00000.

Kang, X., & Han, H. (2008). Graduated Controls The State-Society Relationship in Contemporary China. *Modern China*, *34*(1), 36–55. 00000 c48. doi:10.1177/0097700407308138

Katz, L. (1953). A new status index derived from sociometric analysis. *Psychometrika*, *18*(1), 39–43. 02187. doi:10.1007/BF02289026

King, G. (1995). Replication, Replication. *PS: Political Science & Politics*, *28*(3), 444–452. 00553. doi:10.2307/420301

Levine, J. H. (1977). The network of corporate interlocks in the United States: An overview. In *American Sociological Association Annual Meeting*. 00013 Cited in Ref. davis2003small.

Li, D. D. (1998). Changing incentives of the Chinese bureaucracy. *The American Economic Review*, *88*(2), 393–397. 00217.

Li, L. [Lianjiang]. (2004). Political Trust in Rural China. *Modern China*, *30*(2), 228–258. 00436. doi:10.1177/0097700403261824

Liddell, T. M., & DeDeo, S. (2015). Common Knowledge on Networks. *arXiv:1507.08282 [physics, q-bio]*. 00002. arXiv: 1507.08282 [physics, q-bio]

Lu, Y. [Yao], & Tao, R. (2017). Organizational Structure and Collective Action: Lineage Networks, Semiautonomous Civic Associations, and Collective Resistance in Rural China. *American Journal of Sociology*, *122*(6), 1726–1774. 00001. doi:10.1086/691346

Lu, Y. [Yiyi]. (2007). The autonomy of Chinese NGOs: A new perspective. *China: An International Journal*, *5*(02), 173–203. 00074.

Ma, D., & Parish, W. L. (2006). Tocquevillian Moments: Charitable Contributions by Chinese Private Entrepreneurs. *Social Forces*, *85*(2), 943–964. 00136.

Ma, J., & DeDeo, S. (2018). State power and elite autonomy in a networked civil society: The board interlocking of Chinese non-profits. *Social Networks*, *54*, 291–302. 00003. doi:10.1016/j.socnet.2017.10.001

Ma, J., Jing, E., & Han, J. (2018). Predicting Mission Alignment and Preventing Mission Drift: Do Revenue Sources Matter? *Chinese Public Administration Review*, *9*(1), 25–33. 00000. doi:10.22140/cpar.v9i1.173

Ma, J., & Konrath, S. (2018). A Century of Nonprofit Studies: Scaling the Knowledge of the Field. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, *Forthcoming*. 00000.

Ma, J., Wang, Q., Dong, C., & Li, H. (2017a). The Research Infrastructure of Chinese Foundations, a database for Chinese civil society studies. 00011. doi:10.7910/DVN/OTNI1L

Ma, J., Wang, Q., Dong, C., & Li, H. (2017b). The research infrastructure of Chinese foundations, a database for Chinese civil society studies. *Scientific Data*, *4*, sdata201794. 00011. doi:10.1038/sdata.2017.94

Ma, Q. (2002a). Defining Chinese Nongovernmental Organizations. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, *13*(2), 113–130. 00000 c84. doi:10.1023/A:1016051604920

Ma, Q. (2002b). The Governance of NGOs in China since 1978: How Much Autonomy? *Nonprofit and Voluntary Sector Quarterly*, *31*(3), 305–328. 00154. doi:10.1177/0899764002313001

Ma, Q. (2005). *Non-Governmental Organizations in Contemporary China: Paving the Way to Civil Society?* 00000. Routledge.

Madsen, R. (1993). The Public Sphere, Civil Society and Moral Community: A Research Agenda for Contemporary China Studies. *Modern China*, *19*(2), 183–198. 00144.

Mann, M. (1984). The autonomous power of the state: Its origins, mechanisms and results. *European journal of sociology*, *25*(02), 185–213. 00000 c1469.

Mann, M. (1986). *The sources of social power*. 00327. Cambridge [Cambridgeshire] ; New York: Cambridge University Press.

McAuley, J. J., Costa, L. d. F., & Caetano, T. S. (2007). Rich-club phenomenon across complex network hierarchies. *Applied Physics Letters*, *91*(8), 084103. 00083. doi:10.1063/1.2773951

Ministry of Civil Affairs of the PRC. (2014). Statistics Bulletin of Social Service Development 2013. http://www.mca.gov.cn/article/zwgk/mzyw/201406/20140600654488.shtml.

Mintz, B., & Schwartz, M. (1981). Interlocking Directorates and Interest Group Formation. *American Sociological Review*, *46*(6), 851. 00232. doi:10.2307/2095083

Mizruchi, M. S. (1996). What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual review of sociology*, 271–298. 01572.

Moore, G., Sobieraj, S., Whitt, J. A., Mayorova, O., & Beaulieu, D. (2002). Elite Interlocks in Three U.S. Sectors: Nonprofit, Corporate, and Government. *Social Science Quarterly*, *83*(3), 726–744. 00078 c57. doi:10.1111/1540-6237.00111

National Bureau of Statistics of China. (2017). *China Statistical Yearbook*. 00004. China Statistical Yearbook.

Naumann, F. (2002). *Quality-Driven Query Answering for Integrated Information Systems*. Springer Science & Business Media.

Newman, M. E. J., & Girvan, M. (2004). Finding and evaluating community structure in networks. *Physical Review E*, *69*(2). doi:10.1103/PhysRevE.69.026113

Ni, N., Chen, Q., Ding, S., & Wu, Z. (2016). Professionalization and Cost Efficiency of Fundraising in Charitable Organizations: The Case of Charitable Foundations in China. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*. 00000. doi:10.1007/s11266-016-9765-5

Ni, N., & Zhan, X. (2017). Embedded Government Control and Nonprofit Revenue Growth. *Public Admin Rev*, *77*(5), 730–742. 00007. doi:10.1111/puar.12716

Nie, L., Liu, H. K., & Cheng, W. (2016). Exploring Factors that Influence Voluntary Disclosure by Chinese Foundations. *Voluntas*, *27*(5), 2374–2400. doi:10.1007/s11266-016-9689-0

Olson, J. E. (2003). *Data Quality: The Accuracy Dimension*. Morgan Kaufmann.

Owen-Smith, J., & Powell, W. W. (2004). Knowledge Networks as Channels and Conduits: The Effects of Spillovers in the Boston Biotechnology Community. *Organization Science*, *15*(1), 5–21. 02193. doi:10.1287/orsc.1030.0054

Payne, A. A. (1998). Does the government crowd-out private donations? New evidence from a sample of non-profit firms. *Journal of Public Economics*, *69*(3), 323–345. 00248.

Payne, A. A. (2009). Does Government Funding Change Behavior? An Empirical Analysis of Crowd Out. In *Tax Policy and the Economy* (Vol. 23). 00000 OCLC: 426122374. Cambridge, Mass.; Chicago, Ill.: National Bureau of Economic Research ; University of Chicago Press.

Pearson, M. M. (1997). *China's New Business Elite: The Political Consequences of Economic Reform*. 00002. University of California Press.

Pieke, F. N. (2012). The Communist Party and social management in China. *China Information*, *26*(2), 149–165. 00000 c20.

Pipino, L. L., Lee, Y. W., & Wang, R. Y. (2002). Data Quality Assessment. *Commun. ACM*, *45*(4), 211–218. doi:10.1145/505248.506010

Polanyi, M. (1951). *The Logic of Liberty*. 00618. Routledge & Kegan Paul.

Pombo, C., & Gutiérrez, L. H. (2011). Outside directors, board interlocks and firm performance: Empirical evidence from Colombian business groups. *Journal of Economics and Business*, *63*(4), 251–277. 00086. doi:10.1016/j.jeconbus.2011.01.002

PRC Ministry of Civil Affairs. (2015). The 2014 Statistical Report of Social Service Development. http://www.mca.gov.cn/article/sj/tjgb/. 00002.

PRC Ministry of Finance. (2006). Government revenue and expenditure classification. 00000.

PRC State Council. (2004). Regulations on the Management of Foundations. 00002.

Provost, F., & Fawcett, T. (2013). Data Science and its Relationship to Big Data and Data-Driven Decision Making. *Big Data*, *1*(1), 51–59. 00370. doi:10.1089/big.2013.1508

Redman, T. C. (1997). *Data Quality for the Information Age* (1st). Norwood, MA, USA: Artech House, Inc.

Ribar, D. C., & Wilhelm, M. O. (2002). Altruistic and Joy-of-Giving Motivations in Charitable Behavior. *Journal of Political Economy*, *110*(2), 425–457. 00363. doi:10.1086/338750

Roberts, R. D. (1984). A Positive Model of Private Charity and Public Transfers. *Journal of Political Economy*, *92*(1), 136–148. 00626.

Rubel, A., & Kupferer, H. (1968). Perspectives on the Atomistic-Type Society: Introduction. *Human Organization*, *27*(3), 189–190. 00009.

Saich, T. (2000). Negotiating the State: The Development of Social Organizations in China. *The China Quarterly*, (161), 124–141. 00000 c376.

Salamon, L. M. [Lester M]. (2006). Government-nonprofit relations from an international perspective. In E. T. Boris & C. E. Steuerle (Eds.), *Nonprofits and Government: Collaboration and Conflict* (2nd edition, pp. 399–435). Urban Institute Press.

Salamon, L. M. [Lester M.]. (1987). Partners in Public Service: The Scope and Theory of Government-Nonprofit Relations. In W. W. Powell (Ed.), *The Nonprofit sector: A research handbook* (pp. 99–117). 00000. New Haven: Yale University Press.

Salamon, L. M. [Lester M.]. (1995). *Partners in Public Service: Government-Nonprofit Relations in the Modern Welfare State*. 00000. Baltimore, Md: Johns Hopkins University Press.

Salamon, L. M. [Lester M.]. (2012). Government-nonprofit relations from an international perspective. In J. S. Ott & L. A. Dicke (Eds.), *The Nature of the Nonprofit Sector* (2nd ed, pp. 367–384). 00000. Philadelphia, PA: Westview Press.

Salmenkari, T. (2013). Theoretical Poverty in the Research on Chinese Civil Society. *Modern Asian Studies*, *47*(02), 682–711. 00017. doi:10 . 1017 / S0026749X12000273

Schlæger, J., & Jiang, M. (2014). Official microblogging and social management by local governments in China. *China Information*, 0920203X14533901.

Schmitter, P. C. (1974). Still the century of corporatism? *The Review of politics*, *36*(01), 85–131. 04562.

Scott, J. (1988). Social Network Analysis. *Sociology*, *22*(1), 109–127. 12535. doi:10.1177/0038038588022001007

Scott, J. (2013). *Social Network Analysis* (3rd Edition). Los Angeles: SAGE.

Selsky, J. W., & Parker, B. (2005). Cross-Sector Partnerships to Address Social Issues: Challenges to Theory and Practice. *Journal of Management*, *31*(6), 849–873. 00695. doi:10.1177/0149206305279601

Shan, W. (2013). Social Management: China Goes beyond Maintaining Social Stability. *East Asian Policy*, *05*(02), 36–46. doi:10.1142/S1793930513000147

Shi, T. (2001). Cultural Values and Political Trust: A Comparison of the People's Republic of China and Taiwan. *Comparative Politics*, *33*(4), 401–419. 00339. doi:10.2307/422441

Shieh, S., & Deng, G. (2011). An Emerging Civil Society: The Impact of the 2008 Sichuan Earthquake on Grass-roots Associations in China. *The China Journal*, (65), 181–194. 00000 c48.

Shier, M. L., & Handy, F. (2014). Research Trends in Nonprofit Graduate Studies A Growing Interdisciplinary Field. *Nonprofit and Voluntary Sector Quarterly*, *43*(5), 812–831. 00006. doi:10.1177/0899764014548279

Simon, K. W. (2013). *Civil Society in China: The Legal Framework from Ancient Times to the "New Reform Era"*. 00002. Oxford University Press.

Sorenson, O., & Stuart, T. E. (2001). Syndication Networks and the Spatial Distribution of Venture Capital Investments. *American Journal of Sociology*, *106*(6), 1546–1588. 01620. doi:10.1086/321301

Spires, A. J. (2011). Contingent Symbiosis and Civil Society in an Authoritarian State: Understanding the Survival of China's Grassroots NGOs. *American Journal of Sociology*, *117*(1), 1–45. 00276. doi:10.1086/660741

Steinberg, R. (1985). Empirical Relations Between Government Spending and Charitable Donations. *Journal of Voluntary Action Research*, *14*(2-3), 54–64. 00047. doi:10.1177/089976408501400209

Stuart, T. E. (1998). Network Positions and Propensities to Collaborate: An Investigation of Strategic Alliance Formation in a High-Technology Industry. *Administrative Science Quarterly*, *43*(3), 668–698. doi:10.2307/2393679

Teets, J. C. (2013). Let Many Civil Societies Bloom: The Rise of Consultative Authoritarianism in China. *The China Quarterly*, *213*, 19–38. 00000. doi:10.1017/S0305741012001269

Teets, J. C. (2017). The power of policy networks in authoritarian regimes: Changing environmental policy in China. *Governance*. 00002. doi:10.1111/gove.12280

Trattner, W. I. (1998). *From Poor Law to Welfare State: A History of Social Welfare in America* (6th Edition). 00000. New York: Free Press.

Unger, J., & Chan, A. (1995). China, Corporatism, and the East Asian Model. *The Australian Journal of Chinese Affairs*, (33), 29–53. 00573. doi:10.2307/2950087

von Hayek, F. A. (1945). The Use of Knowledge in Society. *The American Economic Review*, *35*(4), 519–530. 13417.

von Hayek, F. A. (2011). *The Constitution of Liberty: The Definitive Edition* (R. Hamowy, Ed.). 00025 OCLC: 742381174. Chicago: University of Chicago Press.

Walzer, M. (1992). The Civil Society Argument. In C. Mouffe (Ed.), *Dimensions of Radical Democracy: Pluralism, Citizenship, Community* (pp. 89–107). 00910. London: Verso.

Wang, Q. (2016). *Co-Optation or Restriction: The Differentiated Government Control over Foundations in China* (SSRN Scholarly Paper No. ID 2846635). Social Science Research Network. 00000. Rochester, NY.

Wang, Q. (2018). Have Chinese Foundations Become An Independent Sector? An Examination of the Links between Government and Foundations. *Asia Pacific Journal of Public Administration*, *Forthcoming*. 00000.

Wang, R. Y., & Strong, D. M. (1996). Beyond Accuracy: What Data Quality Means to Data Consumers. *Journal of Management Information Systems*, *12*(4), 5–33.

Wang, Z. (2005). Before the Emergence of Critical Citizens: Economic Development and Political Trust in China. *International Review of Sociology*, *15*(1), 155–171. 00181. doi:10.1080/03906700500038876

Warr, P. G. (1982). Pareto optimal redistribution and private charity. *Journal of Public Economics*, *19*(1), 131–138. 00577. doi:10.1016/0047-2727(82)90056-1

Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications*. 25778. Cambridge University Press.

Wei, Q. (2017). From Direct Involvement to Indirect Control? A Multilevel Analysis of Factors Influencing Chinese Foundations' Capacity for Resource Mobilization. *Voluntas*, 1–17. 00000. doi:10.1007/s11266-017-9924-3

Weisbrod, B. A. (1975). Toward a Theory of the Voluntary Nonprofit Sector in a Three-Sector Economy. In E. S. Phelps (Ed.), *Altruism, Morality, and Economic Theory* (First Edition edition). 00000. New York: Russell Sage Foundation.

Weisbrod, B. A. (1977). *The voluntary nonprofit sector: An economic analysis*. 00273. Lexington Books.

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, *48*(4), 817–838. 25855. doi:10.2307/1912934

Whiting, S. H. (1991). The politics of NGO development in China. *Voluntas*, *2*(2), 16–48. 00080. doi:10.1007/BF01398669

Ye, Z. (2003). *China's emerging civil society*. 00069. Brookings Institution Center for Northeast Asian Policy Studies.

Young, D. R. (2006). Complementary, Supplementary, or Adversarial? Nonprofit-Government Relations. In E. T. Boris & C. E. Steuerle (Eds.), *Nonprofits and Government: Collaboration and Conflict* (2nd edition, pp. 37–79). 00000. Washington, D.C.: Urban Institute Press.

Zhang, R., Rezaee, Z., & Zhu, J. (2010). Corporate Philanthropic Disaster Response and Ownership Type: Evidence from Chinese Firms' Response to the Sichuan Earthquake. *J Bus Ethics*, *91*(1), 51. 00160. doi:10.1007/s10551-009-0067-3

Zhao, R., Wu, Z., & Tao, C. (2016). Understanding Service Contracting and Its Impact on NGO Development in China. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*. 00000. doi:10.1007/s11266-016-9714-3

Zhong, Y. (2014). Do Chinese People Trust Their Local Government, and Why?: An Empirical Study of Political Trust in Urban China. *Problems of Post-Communism*, *61*(3), 31–44. 00028. doi:10.2753/PPC1075-8216610303

Zhou, S., & Mondragon, R. (2004). The Rich-Club Phenomenon in the Internet Topology. *IEEE Communications Letters*, *8*(3), 180–182. 00463 c373. doi:10.1109/LCOMM.2004.823426

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Ma, J., & DeDeo, S. (2018). State power and elite autonomy in a networked civil society: The board interlocking of Chinese non-profits. *Social Networks*, *54*, 291–302. 00003. doi:10.1016/j.socnet.2017.10.001.

Ma, J., Jing, E., & Han, J. (2018). Predicting Mission Alignment and Preventing Mission Drift: Do Revenue Sources Matter? *Chinese Public Administration Review*, *9*(1), 25–33. 00000. doi:10.22140/cpar.v9i1.173.

Han, J., Ma, J., & Wang, Z. (2018). Social Value Chains: A New Organizational Framework for Studies on State-Society Relations in China. *Chinese Public Administration Review*, *9*(1), 55–74. 00000. doi:10.22140/cpar.v9i1.152.

Ma, J., Wang, Q., Dong, C., & Li, H. (2017b). The research infrastructure of Chinese foundations, a database for Chinese civil society studies. *Scientific Data*, *4*, sdata201794. 00011. doi:10.1038/sdata.2017.94.